Petition

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No. 81-677

In the Supreme Court of the United States

October Term, 1981

MINNESOTA MINING AND MANUFACTURING COMPANY, 3M BUSINESS PRODUCTS SALES, INC., RO-BIND CORPORATION, RALLY INDUSTRIES,
Petitioners,

vs.

VELO-BIND, INCORPORATED,
Respondent.

ON CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT

PETITION FOR WRIT OF CERTIORARI

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QUESTIONS PRESENTED

This petition brings here for review the judgment, entered in a patent case by Judge Ingram following a jury verdict in the United States District Court for the Northern District of California, affirmed by Judges Duniway and Sneed in the United States Court of Appeals for the Ninth Circuit to the extent of holding two patents on a book binding machine valid and infringed, with Judge Poole dissenting (on the ground the two machine patents are not infringed, or, if deemed infringed, are invalid) and presents for review the questions:

1. Whether, contrary to the decision of every other court on the point, a patent may be read without limiting its "means" claims by the structure described in the specification (even though 35 U.S.C. §112 says patent claims expressing an element as a means *"shall be construed"* to cover the structure "described in the specification and equivalents thereof").[1]

2. Whether the construction given the statute by the Court of Appeals frustrates the will of Congress which enacted 35 U.S.C. §112 to authorize "means" claims but required the "means" to be limited to the structure "described in the specification and equivalents thereof" (overruling *Halliburton Oil Well Cementing Co. v. Walker* (1946), 329 U.S. 1, 8-9, where this Court held "means" plus function claims *per se* invalid).

3. Whether, under 35 U.S.C. §112 a "means" claim may cover any "means" embraced by the claim (irrespective of "the corresponding structure * * *

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1. Emphasis supplied throughout.

described in the specification,") on the ground that, as the Court of Appeals held, the claims are *"part of the specifications."*

4. Whether failure to construe "means" claims with reference to the structure *"described in the specification"* makes those claims invalid as no longer "particularly pointing out and distinctly claiming" the invention, contrary to 35 U.S.C. §112.

5. Whether the rule adopted by the Court of Appeals impermissibly enlarges the doctrine of equivalents, and thereby sets a false standard for future cases, by—in the terms of this case—adjudging as an equivalent the accused machine which utilizes, what in the jargon of the patent is called, "shear means", *only after* the bind is complete, whereas the patented machine utilizes "shear means" to *effect* the bind.

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OPINIONS

Judge Ingram's opinion in the District Court, overruling petitioner Minnesota Mining and Manufacturing Company's motion for judgment n.o.v., unreported, is reproduced in the Appendix. A25.

The majority opinion of the Court of Appeals, and the dissenting opinion of Judge Poole, are reported in 647 F.2d 965 and are reproduced in the Appendix. A1.

GROUNDS FOR REVIEW

The judgment of the Court of Appeals is dated, and was entered, June 8, 1981.

Rehearing was denied by the Court of Appeals July 14, 1981.

The District Court had jurisdiction under 28 U.S.C. §1338(a); the Court of Appeals had jurisdiction to review under 28 U.S.C. §1292(a)(4); and this Court has jurisdiction to review by Writ of Certiorari pursuant to 28 U.S.C. §1254(1) filed within the time specified by 28 U.S.C. §2101(c).

STATUTE INVOLVED

The statute primarily involved, 35 U.S.C. §112, is reproduced in the Appendix. A33. The parts of the statute that bear on this appeal, with the provisions here particularly relevant indicated by italics, read as follows:

> **"§112 Specification.**
>
> The specification shall contain *a written description of the invention*, and of the manner and process of making and using it, *in such full, clear, concise and exact terms* as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.
>
> The specification shall conclude with one or more claims *particularly pointing out and distinctly claiming* the subject matter which the applicant regards as his invention.

* * * * *

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim *shall be construed* to cover the corresponding structure, material, or acts *described in the specification* and equivalents thereof." [July 19, 1952, c. 950, §1, 66 Stat. 798; amended July 24, 1965, Pub.L. 89-83 §9, 79 Stat. 261; Nov. 14, 1975, Pub.L. 94-131 §7, 89 Stat. 691.]

STATEMENT OF CASE

To see where the Court of Appeals misconstrued the governing statute 35 U.S.C. §112, fell into conflict, and departed from the accepted and usual course of judicial proceedings, it will be helpful to note:

—The Patents In Suit

This case concerns:

U.S. Patent 3,608,117 (A35) upon a "Machine for Binding and Punching Sheets" (as for example, to form a book, although the patent is not limited to that use). The patent has 10 claims, 3 of which (namely claims 1, 2 and 3) were in issue, and were held valid and infringed by a divided Court of Appeals. Claim 1 was treated as typical.

U.S. Patent 3,756,625 (A45) upon "Apparatus for Binding Books". The patent has 18 claims, 2 of which (namely claims 1 and 7) were in issue, and were held valid and infringed by a divided Court of Appeals. Claim 1 was treated as typical.

—The Patented Bind

The patented Velo-Bind machine forms the bind:

"by placing on either side of the pages to be bound, and then compressing, a male plastic strip with nail-like studs and a female plastic strip with holes corresponding to the studs.

The machine which Velo-Bind eventually developed for sale joins the two strips to form a lasting bind through the use of a 'hot knife' process. In this process, once the strips are pressed together with the studs from the male strip projecting through the holes in the female strip, a hot knife or shear cuts off the excess length of the studs leaving heat softened stud ends. These malleable ends are then deformed into rivets by the striking action of heading arms. The rivet heads quickly cool creating a permanent bind." 647 F.2d at 967; A3.

—The Prior Art

Velo-Bind's inventors were not the first to find a way, or build a machine, to bind things together. As Judge Poole pointed out:

"Velo-Bind's primary claims describe a means of securing and inserting plastic pins contained in one strip into complementary holes in an opposing strip. This type of fastening is not by itself new and would not entitle Velo-Bind to a patent.

* * * * *

Velo-Bind's primary claims are said to deal with shearing the pins after insertion. This alone is neither remarkable or patentable." 647 F.2d at 975-976; A22-23.

—The Means Claimed

Claim 1 of the '117 patent, A42 (taken by the litigants and both courts below as representative) calls

for a machine to form the bind in the manner above stated by the Court of Appeals, but does not mention the "hot knife" to cut off the surplus length of the plastic studs, and soften the stud ends, which, when hammered to form rivet heads, and cooled, hold the pages together. The claim instead merely calls for:

"*shear means* to cut off the ends of said studs * * *."

Claim 1 of the '625 patent, A55, also taken as typical, similarly—without reference to a "hot knife" or the rivet forming function—calls for:

"*cutting means* * * * to cut off the ends of said studs * * *."

—The Critical Issue

The critical issue is whether 35 U.S.C. §112 *limits* the reach of the patent to "means" that bind sheets together in the manner described in the specification. The specification of patent '117 discloses that the bind is made when the excess ends of the studs:

"*are cut off by hot blades* and rivet-like heads are formed on the severed ends by heading arms which strike the molten ends of the studs * * *." '117 Patent Col. 1, Lines 26-29.[2]

The '625 patent similarly discloses (p. 1, right hand column) that the bind is formed when:

"Excess stud length * * * is cut off * * * *by heated knives*" which are then "moved upward, deforming the stud * * * to form heads."

---

2. The call for a "hot knife" is repeated throughout the specification, e.g., '117 Patent, Col. 1, Lines 46-49; Col. 3, Lines 26-27; Col. 5, Lines 13-16, 36, 58; Col. 6, Lines 34-35, 46-47.

other court that has passed on the question, and in effect repealed the statute. The Court of Appeals did this in a curious way. Note the pattern of erroneous reasoning:

1. *Each claim is a separate patent.* Claim 1 of the '117 patent does not call for "shear means" requiring a "hot knife", nor does Claim 1 of the '625 patent. Claim 4 of the '117 patent, on the other hand, *defines* the "shear means" as including "means to heat said blades."[4]

Thus, reasoned the Court of Appeals, Velo-Bind has in effect *two patents*—one for a "hot knife", the other for a "cold knife". As the Court of Appeals put it:

> "whether the knife is hot or cold is immaterial." 647 F.2d at 969, A8.

In other words:

> "Velo-Bind's 'actual invention' included not only a machine using the hot knife process—e.g., claim 4—but also a machine preparing sheets for strip binding *no matter how the bind was to be secured* * * *." 647 F.2d at 969, A9.

The Court of Appeals gave an example: "The carpenter's nail is very old art indeed". 647 F.2d at 970, A11.

Thus, under the reading given the claim, the sheets could be "nailed" together, or fastened *in any other way;* by glue, for example, or twine, or wire, and so on *"no matter how the bind was to be secured."* 647 F.2d at 969, A9.

The effect is to set the patent completely at large.

Even the ancient Acco binder, under the reading given to the Velo-Bind patent, would infringe.

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4. So do claims 5, 6, 7, 8 and 9 of the '117 patent and claims 9, 10, 12, 13 and 14 of the '625 patent.

As courts put it, a claim, so read, is overbroad and therefore, invalid. That was Judge Poole's view. He thought the construction adopted by the Court of Appeals:

> "gives those claims interpretation so broad that they would be invalid." 647 F.2d at 975, A22.

2. *Claims are themselves specifications.* As the Court of Appeals put it:

> "The claims themselves * * * are also part of the specifications * * *." 647 F.2d at 968, A6.

The Court derived this from 35 U.S.C. §112 which, after demanding a full, clear and exact description of the invention, says:

> "The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." A34.

It was error to treat claims as synonymous with specifications. They are different, and they need to be distinguished one from the other.

Equally mistaken is the conclusion of the Court of Appeals that—

3. *Claims not limited by specification.* The Court of Appeals erroneously concluded that 35 U.S.C. §112:

> "*does not require* that the claim be further limited to the description in the specifications." 647 F.2d at 968, A7.

In so reasoning the Court of Appeals disregarded the statutory command that the "means" recited in the claims "*shall* be construed to cover the corresponding structure * * * described in the specification * * *."

The statute's direction to look to the "corresponding structure" *described in the specification* could not possibly

have been intended by the Congress to refer to the claim itself.

The Court of Appeals rationalized its construction of 35 U.S.C. §112 on the ground—

4. *One machine is equivalent of the other.* Upon the concept that "shear or cutting means, whether hot or cold, function simply to cut off the stud ends," 647 F.2d at 969, A7, the Court of Appeals turned the doctrine of equivalents upside down and inside out. This is the way the Court of Appeals did it:

> "Even if either claim 1 were understood to describe a hot knife to cut off the studs, certainly a cold knife used to perform the same function would be covered by the claim, if not literally, then under the doctrine of equivalents." 647 F.2d at 969, A8.

But the two do *not* perform *the same function.* They do *not* produce the same result, or work in the same way.

Velo-Bind, to be sure, utilizes its knife to cut off the stud ends. Note, however, that at this stage *the bind has not been made.* The stud ends must still be softened, hammered into rivet heads, and cooled, to effect a bind.

In the accused 3M Machine, on the other hand, the bind is effected *by the ratchet teeth.* The knife *has nothing to do with the bind.* The knife comes into play *only after* the bind is complete, to cut off the surplus ends.

Judge Poole made this clear. In Velo-Bind, Judge Poole pointed out:

> "Fashioning these rivet heads is not simply cosmetic; it is the essential aspect of the Velo-Bind machine. By contrast, use of ratchet pins is the essential element of the 3-M machine. 3-M's binding process is complete when the ratchet pins have been inserted and locked. Unlike Velo-Bind's device, it does not require a rivet head for security." 647 F.2d at 976, A23.

ARGUMENT

THE COURT SHOULD GRANT REVIEW

The questions this case presents need the Court's attention to restore order to important principles of patent law now unsettled by the decision below.

1. Conflict Created By the Decision Should Be Resolved By This Court

Every court that has passed on the construction of 35 U.S.C. §112 (other than the court below) has held, in accord with the statute's mandatory demand, that "means" language used in claim drafting *"shall be construed"* to cover the structure disclosed *"in the specification"* or equivalents thereof. In holding that 35 U.S.C. §112 does *not* require that "means" claims be "limited to the description in the specification" the Court of Appeals has put itself in conflict with decisions of the Court of Appeals for the 4th, 5th, 6th, 7th and 10th Circuits, and with the decisions of the Court of Claims and the Court of Customs and Patent Appeals. Observe:

> *Hale Fire Pump Co. v. Tokai, Ltd.* (C.C.P.A., 1980), 614 F.2d 1278 (Judges Miller, Markey, Rich, Baldwin, Maletz), confined the "means" claim to (p. 1279) "The only releasable means *described in the specification* * * *."
>
> *Lockheed Aircraft Corporation v. United States* (Ct. Cl., 1977), 553 F.2d 69 (Judges Cowen, Davis, Skelton, Nichols, Kashiwa, Kunzig, Bennett) held it (p. 80) *"essential* in clauses which utilize 'means' clauses *to look to the specification* to establish the structure covered thereby * * *."

Bullard Company v. General Electric Company (4th Cir., 1965), 348 F.2d 985 (Judges Bryan, Bell, Lewis) noting (p. 989) Bullard "insists that the function drum is but one of the means to accomplish * * * control of the invention, and that the patent claims *cover all means* to that end," responded: "We cannot grant so comprehensive a reading of 'means' in the claims; it would preempt all and every conceivable form of programming. The patentee is not entitled to that unlimited exclusiveness."

Bryan v. Sid W. Richardson, Inc. (5th Cir., 1958), 254 F.2d 191, *cert. denied* (1958), 358 U.S. 815 (Judges John R. Brown, Rives, Wisdom) pointed out (p. 195) "the claim with this [means] language in it" does not "grant a monopoly on every means or mode by which that result could be achieved;" rather, "As the Act [§112] phrases it, these *are confined* to corresponding structures or acts *described in the specification* and equivalents thereof."

Tillotson Manufacturing Company v. Textron, Inc., Homelite (6th Cir., 1964), 337 F.2d 833 (Judges Weick, O'Sullivan, Phillips), considered (p. 838) "Claim 2 *must be read* in the light of the specification and drawings."

Crane Company v. Aeroquip Corporation (7th Cir., 1974), 504 F.2d 1086 (Judges Cummings, Swygert and Pell) ruled (p. 1091) "Under this statute [35 U.S.C. §112], the district court was *required to construe* these five claims with reference to the patent *specification*."

Wagner Iron Works v. Koehring Company (10th Cir., 1960), 282 F.2d 317 (Judges Phillips, Murrah,

> Breitenstein) pointed out that while §112 permits (p. 321) claim to "a means of performing a specific function", it does not broaden the claim "beyond the corresponding structure *described in the specification* * * *."

The conflict the Court of Appeals has created is the more serious because—

2. Decision Thwarts Congressional Purpose In Enacting the Statute

In *Halliburton Oil Well Cementing Co. v. Walker* (1946), 329 U.S. 1, this Court held "means" language at the point of novelty *per se* invalid because framed:

> "in terms of what it will do rather than in terms of its own physical characteristics or its arrangement in the new combination apparatus." 329 U.S. at 9.

Congress responded to *Halliburton* by enacting 35 U.S.C. §112. *Bryan v. Sid W. Richardson, Inc.* (5th Cir., 1958), 254 F.2d 191, 194. In that statute Congress permitted an element in a claim to be expressed "as a means or step for performing a specified function" without reciting the "structure, material or acts," *provided* such claim:

> "*shall be construed* to cover the corresponding structure, material or acts *described in the specification* and equivalents thereof." A34.

That change was designed, the court observed in *Application of Lundberg* (C.C.P.A., 1957), 244 F.2d 543 (Judges Johnson, Worley, Rich, Jackson) (p. 547) "to modify or overrule" *Halliburton*. Charles J. Zinn, House Committee's Law Revision Counsel, observed that the enactment "offsets the theory of the *Halliburton* case", *Commentary on New Title 35*, U.S. CODE CONG. & AD. NEWS

2507, 2514. P.J. Federico considered that the statute makes *Halliburton* "obsolete", *Commentary on the New Patent Act*, Vol. 1, Title 35 U.S.C.A. 1, 25-26. Similarly, Robert Smith, *Functional Claims and the Patent Act of 1952*, 48 JOURNAL OF THE PATENT OFFICE SOCIETY 426, 432, 434, noted the effect of the statute as "Offsetting" *Halliburton*. Hearings Before the Subcommittee No. 3 of the Committee on the Judiciary, House of Representatives, 82nd Congress, 1st Session (1951).

It is pointed out by Frederic B. Schramm in *The Relationship of the Patent Act of 1952 to the Antitrust Laws*, 23 GEORGE WASHINGTON LAW REVIEW 36, 50:

> "It has long been held that 'the claims of a patent must always be explained by and read in connection with the specification.'
>
> The phraseology of Section 112 will no doubt be interpreted in the light of existing cases. Accordingly in some respects this section does not alter previous law, nor will it open the door to unlimited use of functional language to accomplish breadth of scope in the claim since the statute specifically sets forth that where the functional language is used the claim will be 'construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.' "

If, however, "means" language is not to be limited as the statute demands, Velo-Bind's claims are invalid on the very ground adjudicated by this Court in *Halliburton*.

3. Court's Effort to Escape §112 Puts It In Conflict With This Court's Cases

The Court of Appeals mistakenly sought to put the "means" claims of Velo-Bind's patent beyond reach of

35 U.S.C. §112 on the ground the claims *are* "part of the specification".

The Court of Appeals failed to recognize that it was for the purpose of *distinguishing* between specifications and claims that Congress enacted the statute (which formerly, in the same paragraph, called for specifications *and* claims, 35 U.S.C. §33 (1946), R.S. §4888, March 3, 1915, c. 94, §1, 38 Stat. 958) to place these requirements, as they now are in 35 U.S.C. §112, in *separate paragraphs*. The Senate Committee (S. REPORT No. 1979, 82nd Congress, 2d Session (1952), U.S. CODE CONG. & AD. NEWS 2394, 2412) explained the change, saying:

> "The clause relating to the claim is made a separate paragraph *to emphasize the distinction* between the description and the claim or definition * * *."

The *first* difficulty with the view of the Court of Appeals is that *if* claims *are* specification, and no distinction is to be drawn between them, then claims and specifications swallow one another. They suffer the fate of the Gingham dog and the Calico cat; they "wallowed this way and tumbled that," and "ate each other up".

To say they are the same is a contradiction.

A *second* difficulty is that the decision puts the Court of Appeals in conflict with this Court's cases. This Court *distinguishes* claims from specifications. For example:

> *United States v. Adams* (1966), 383 U.S. 39, says (p. 49) "it is fundamental that *claims* are to be construed *in the light of the specifications* * * *."
>
> *Singer Manufacturing Company v. Cramer* (1904), 192 U.S. 265, says (p. 285) "the claim * * * must be construed to refer to elements * * * *as described* in the specification * * *."

Schriber-Schroth Co. v. Cleveland Trust Co. (1940), 311 U.S. 211, says (p. 217) "*claims* of a patent are * * * interpreted *in the light of its specifications* * * *."

The further vice in the construction given the statute by the Court of Appeals is that—

4. Claims Cut Free of §112 No Longer Serve to "Point Out and Distinctly Claim" Invention

Release from the disclosure in the specification by giving to 35 U.S.C. §112 the construction of the Court of Appeals gives patent claims so broad a reading they no longer serve the statutory purpose of "particularly pointing out and distinctly claiming" the invention. Any "means" heretofore known or hereafter discovered will fall within the patent monopoly.

The enactment of §112 did not diminish the obligation to "particularly point out and distinctly claim" the invention. As the court put it in *Application of Henatsch* (C.C.P.A., 1962), 298 F.2d 954 (Judges Smith, Rich, Martin) while §112 permits "means" claims without the recital of the structure (p. 957):

> "it does not permit an applicant to avoid the requirement imposed by the second paragraph thereof [i.e., §112], that the claims shall particularly point out and distinctly claim the subject matter which the applicant regards as his invention."

Application of Lundberg (C.C.P.A., 1957), 244 F.2d 543 (Judges Johnson, Worley, Rich, Jackson) similarly holds the enactment (p. 547) "has not * * * at all diminished" the obligation to frame claims "particularly pointing out and distinctly claiming" the invention.

It is "imperative," the court held in *Lockheed Aircraft Corporation v. United States* (Ct. Cl., 1977), 553 F.2d 69 (Judges Cowen, Davis, Skelton, Nichols, Kashiwa, Kunzig, Bennett), to comply with the statute (p. 81) "which requires that the claims of a patent particularly point out and distinctly claim the subject matter that the applicant regards as his invention * * *."

Denuded of the obligation to measure the claim by the structure described in the specification, the claim, as Judge Poole observed, becomes so broad it is invalid. 647 F.2d at 975, A22.

5. Decision Removes Critical Limits On Operation of Doctrine of Equivalents

The doctrine of equivalents is, by the decision below, released of all bounds. Anything that produces the same result, as for example, in this case, a bound book, is covered by the patent. No amount of argument, no method of rationalization, can make the "shear means" of the 3M machine which *serves no purpose in effecting the bind* (and serves *only* to cut off the surplus ends *after* the bind is complete) the equivalent of the "shear means" of the Velo-Bind patent *which effects the bind.*

CONCLUSION

The public interest calls for review.

Nearly a decade ago, in 1972, it was pointed out, in 54 JOURNAL OF THE PATENT OFFICE SOCIETY 248, 270, that:

> "Some day the Supreme Court is going to have its attention persuasively focused on the exact language of Section 112."

That day is here.

Respectfully submitted,

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Appendix

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OPINION OF THE UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT
647 F.2d 965

(Decided June 8, 1981)

Nos. 79-3338, 79-44448 and 79-4584

UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

VELO-BIND, INCORPORATED, a California Corporation,
Plaintiff-Appellant,

v.

MINNESOTA MINING & MANUFACTURING COMPANY, a corporation; 3M BUSINESS PRODUCTS SALES, INC., a corporation; RO-BIND CORPORATION, a corporation; RALLY INDUSTRIES, a corporation; and JOE D. GIULIE,
Defendants-Appellees.

VELO-BIND, INCORPORATED, a California Corporation,
Plaintiff-Appellee,

v.

MINNESOTA MINING & MANUFACTURING COMPANY, a corporation; 3M BUSINESS PRODUCTS SALES, INC., a corporation; RO-BIND CORPORATION, a corporation, and RALLY INDUSTRIES, a corporation,
Defendants-Appellants.

VELO-BIND, INCORPORATED, a California Corporation,
Plaintiff-Appellee,

v.

MINNESOTA MINING & MANUFACTURING COMPANY, a corporation; and 3M BUSINESS PRODUCTS SALES, INC., a corporation,
Defendants-Appellants.

Patent infringement action was brought. The United States District Court for the Northern District of California, William A. Ingram, J., entered judgment on jury verdict, and appeal was taken. The Court of Appeals, Duniway, Circuit Judge, held that: (1) patent No. 3,608,117 for strip binding machine for use in binding books and documents and patent No. 3,756,625 for method for binding books and documents were valid, despite claims of failure to satisfy disclosure requirements, of anticipation by prior art, and of obviousness, and such patents were infringed; however, evidence was insufficient to support jury finding that patent No. DES 227,195 for design of binding machine was infringed; (2) infringement could not entitle holder to award of damages for lost profits on sale of unpatented, consumable supplies; (3) evidence was sufficient to support award by jury to holder of patents of $645,578 for lost profits on patented machines and $268,000 in added costs caused by rushing new model into competition with infringer's machine; and (4) it was not abuse of discretion to refuse to award treble damages or attorney fees.

Affirmed in part and reversed in part.

POOLE, *Circuit Judge*, dissented in part and concurred in part and filed opinion.

Appeal from the United States District Court for the Northern District of California.

Before DUNIWAY, SNEED and POOLE, *Circuit Judges*.

DUNIWAY, *Circuit Judge*:

In No. 79-4448 appellants (hereinafter 3M) appeal from the district court's judgment, entered following a jury trial, finding that the 3M Model 1000 binding machine infringes three valid patents owned by Velo-Bind, awarding damages

to Velo-Bind of $3,934,333 plus interest, and permanently enjoining 3M from infringing the patents. We affirm in part and reverse in part.

In No. 79-4584 3M further appeals from the district court's refusal to modify the injunction so as to specifically exempt 3M's proposed 1000DA binding machine from its terms. We affirm.

In No. 79-3338 Velo-Bind cross-appeals from the district court's refusal to award treble damages and attorney's fees. We affirm.

I. *Facts.*

In 1966, William Abildgaard and Charles Groswith formed what is now Velo-Bind for the purpose of inventing a new system of binding books and documents. After several false starts, they succeeded in 1968 in inventing a strip binding machine. Simply stated, this machine forms a bind by placing on either side of the pages to be bound, and then compressing, a male plastic strip with nail-like studs and a female plastic strip with holes corresponding to the studs.

The machine which Velo-Bind eventually developed for sale joins the two strips to form a lasting bind through the use of a "hot knife" process. In this process, once the strips are pressed together with the studs from the male strip projecting through the holes in the female strip, a hot knife or shear cuts off the excess length of the studs leaving heat softened stud ends. These malleable ends are then deformed into rivets by the striking action of heading arms. The rivet heads quickly cool creating a permanent bind.

Desiring to manufacture and market its invention but short of capital, Velo-Bind entered into negotiations with

3M in 1971. When these negotiations ended without an agreement, Velo-Bind proceeded on its own, eventually manufacturing several models of its by then patented strip binder, all of which employed the hot knife system.

3M also proceeded on its own. In 1975, 3M began selling its Model 1000 binding machine. Although a strip binding machine similar in structure to Velo-Bind's, 3M's machine forms its bind by means of ratchet teeth on the studs of the male strip, engaged and held in place by friction-locking blocks in the female strip. Thus there is no need to heat the stud ends in order to form rivets, and the excess length of the studs is removed by a cold knife.

Velo-Bind brought suit claiming infringement of three of its patents—claims 1, 2, and 3 of patent No. 3,608,117 for Machine for Binding and Punching Sheets (hereinafter the '117 patent); claims 1 and 7 of patent No. 3,756,625 for Method and Apparatus for Binding Books (hereinafter the '625 patent); and the design patented in patent No. DES 227,195 for Machine for Binding Books (hereinafter design '195). Because claims 2 and 3 of the '117 patent and claim 7 of the '625 patent are dependent upon claim 1 of their respective patents, and because the design patent concerns only the outward appearance of the machine and only $250 in damages, the two claim 1's became the focus of the litigation.

At trial Velo-Bind presented extensive testimony by an expert witness, Harris Zimmerman. 3M did not counter with an expert of its own, nor did it challenge Zimmerman's qualifications. The jury found that each patent claim in issue was both valid and infringed, and awarded damages to Velo-Bind that included not only lost profit on the sale of the machines but also lost profit on the sale of unpatented paper, plastic strips, and book covers. The district court refused to overturn this verdict and further

enjoined 3M from future infringements, without exception for 3M's proposed 1000DA model.

In these appeals 3M argues as a matter of law that there was no infringement, that Velo-Bind's patents are invalid, that the jury's damage measure was improper, and that 3M was entitled to a ruling that its proposed Model 1000DA did not infringe Velo-Bind's '117 and '625 patents. Velo-Bind cross-appeals from denial of treble damages and attorney's fees.

II. *Infringement.*

3M argues that its Model 1000 does not infringe Velo-Bind's patent claims as a matter of law, and thus that it was entitled to a judgment in its favor. The gist of 3M's argument is that when properly construed, Velo-Bind's mechanical patent claims refer only to a machine employing the hot-knife process. We disagree.

Claim 1 of the '117 patent describes a strip binding machine as follows:

> Apparatus for binding sheets together with the use of a first strip, a plurality of studs projecting from and spaced longitudinally relative to said first strip and a second strip formed with apertures spaced longitudinally of said second strip at intervals complementary to said studs, said apparatus comprising a frame having means shaped to receive one said strip, a platen table adjacent said means to support apertured sheets, a pressure foot formed to engage the other of said strips, cooperating means on said frame and said pressure foot to move said pressure foot toward said first-mentioned means to bring said strips together with said studs projecting through said apertures, and shear means to cut off the ends of said studs projecting through said second strip.

Claim 1 of the '625 patent is much the same although it refers to a "cutting means" instead of a "shear means" to cut off the stud ends.

Recognizing that the literal language of either claim 1 covers its Model 1000, 3M seeks to limit the claims by reading into them both a hot knife and the hot knife binding process. 3M correctly argues that the use of "means" terminology brings into play 35 U.S.C. § 112. Under this section where a claim uses "means" language, "such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." 3M argues that since the specifications must be referred to, and since they describe a hot knife or shear, each claim 1 must therefore be read to include a hot knife and the hot knife binding process thus excluding 3M's cold knife machine from its terms.

In making this argument 3M looks only to one part of the specifications—the general description of the hot knife process preceding the claims. The claims themselves, however, are also part of the specifications. 35 U.S.C. § 112. And looking to the other claims, including those not at issue, it appears that by "shear means" or "cutting means" neither claim 1 refers only to a heated knife. For example, claim 4 of the '117 patent refers to "a plurality of blades . . . *and heating means* to heat said blades." (emphasis added). Claim 9 of the same patent describes an "[a]pparatus . . . which *further* comprises *heating means* to heat said shear means. . . ." (emphasis added). In view of the other claims in the two patents, it appears both that the failure of either claim 1 to specify a hot knife was deliberate and that in any event a "shear means" or "cutting means" and a "heating means" are different structures.

More importantly, 3M's argument of non-infringement assumes that *if*, by "shear means" or "cutting means" and

the application of section 112, claim 1 of either patent must have reference to a hot knife, then it must also be understood to refer only to the hot knife *binding process*. Such an assumption is unwarranted. Neither claim 1 makes any reference to the hot knife binding process, and the description of this process in the specifications does not limit the claims. *Smith v. Snow,* 1935, 294 U.S. 1, 11, 55 S.Ct. 279, 283, 79 L.Ed. 721, ("the claims of the patent, not its specifications, measure the invention.").

Moreover, this assumption finds no support in section 112, which requires only that shear or cutting "means" be construed in light of the "*corresponding* structure, material or acts" in the specifications; it does not require that the claim be further limited to the description in the specifications. Nor can it be argued that the hot knife binding process—as opposed to a hot knife—is the "corresponding structure material or acts" of the shear or cutting means referred to in the claims. The shear or cutting means, whether hot or cold, function simply to cut off the stud ends. The process of creating a permanent bind, whether by friction fit strips, ratchet teeth on the male studs, or formation of rivet heads, is a separate matter. 3M showed as much in its cross-examination of Zimmerman:

> Q. . . . Now, what is the function which the shear means provides in the patented machine?
>
> A. The function is to enable the machine to accommodate the different thicknesses of bound volumes.
>
> Q. And the function is to cut off the ends of the studs, is it not?
>
> A. That's correct.

Without the assumption that the hot knife and the hot knife binding process are the same, 3M's contention that "shear means" or "cutting means" refers to a hot knife is

of little significance. Even if either claim 1 were understood to describe a hot knife to cut off the studs, certainly a cold knife used to perform the same function would be covered by the claim, if not literally, then under the doctrine of equivalents. *See Graver Tank & Mfg. Co., Inc. v. Linde Air Products Co.*, 1950, 339 U.S. 605, 608-609, 70 S.Ct. 854, 856-857, 94 L.Ed. 1097. Zimmerman gave uncontradicted testimony that "anyone skilled in just about any . . . mechanical art would know that if you cut something . . . you do it faster, probably less noisy and less pressure required to cut with a hot blade or a hot knife. Only anyone that has the skill of any kind in the art knows that you can also cut with cold knives."

In short, because neither claim 1 is limited to the hot knife binding process, whether the knife is hot or cold is immaterial. There is infringement either way.

3M makes several other arguments against a finding of infringement, none of which is convincing, First, 3M argues that Velo-Bind's advertising and other corporate statements indicate that it understood the patent and the actual invention to be limited to a hot knife binding process. Even if probative of the scope of claim 1, however, these statements were contradicted by other evidence in the record as to Velo-Bind's intention. The jury's implicit finding of fact that these corporate statements did not define the scope of Velo-Bind's invention or understanding was reasonable and was supported by substantial evidence. Moreover, an inventor's decision to manufacture and market one embodiment of his invention obviously does not limit the patent to that embodiment. *Continental Paper Bag Co. v. Eastern Paper Bag Co.*, 1908, 210 U.S. 405, 418, 28 S.Ct. 748, 751, 52 L.Ed. 1122.

Second, 3M argues that because Velo-Bind did not assert the doctrine of equivalents at trial it may not do so

here. But the trial court instructed the jury on this doctrine, and in any event, "[a]n appellee may defend a judgment on any ground consistent with the record." C. Wright, Law of Federal Courts, § 104, p. 523 (3d ed.).

Finally, 3M argues that Velo-Bind conceded that the cold knife was not equivalent to a hot knife. 3M bases this argument on Velo-Bind's failure to charge infringement of those claims specifying a hot knife and on Groswith's testimony in which he "guessed" that Velo-Bind had not charged 3M with infringing claim 4 of the '117 patent because 3M's machine "doesn't have heating means to heat the blades." But neither of these facts amounts to a formal concession of no infringement. And even were we to agree that Velo-Bind had conceded no infringement of claims such as claim 4 of the '117 patent, it does not follow that there was no infringement of claim 1. "[A] patentee's broadest claim can be no broader than his actual invention," *Kemert Corp. v. Printing Arts Research Laboratories*, 9 Cir., 1953, 201 F.2d 624, 633, but Velo-Bind's "actual invention" included not only a machine using the hot knife *process*—e. g., claim 4—but also a machine preparing sheets for strip binding no matter how the bind was to be secured, e. g., claim 1. Thus the rule, also stated in *Kemart Corp., supra*, "that in interpreting a series of claims, a limitation not present in one may not be implied where the same limitation appears in later claims," is applicable here.

Thus we affirm the finding of infringement of Velo-Bind's mechanical patents '117 and '625. However, we cannot accept the jury's finding of infringement of Velo-Bind's design '195. Having examined the design '195 and the infringing machine, we conclude that the designs are not so substantially the same "in the eye of an ordinary observer . . . such as to deceive such an observer." *Sun Beam Lighting Co. v. Pacific Associated Lighting, Inc.*, 9 Cir., 1964, 328

F.2d 300, 301. The jury's finding to the contrary was not supported by substantial evidence.

III. *Validity.*

3M argues that Velo-Bind cannot have it both ways: If Velo-Bind's patents are interpreted to cover more than the hot knife process so as to support a finding of infringement, then these same patents must be held invalid as a matter of law. In particular, 3M argues that if claim 1 of the '117 or '625 patent covers more than the hot knife binding process disclosed in the specifications, it is invalid because it fails to meet the disclosure requirements of 35 U.S.C. § 112, or because it is anticipated by prior art under 35 U.S.C. § 102, or because it would be obvious to someone skilled in the art under 35 U.S.C. § 103.

A. *Validity under 35 U.S.C. § 112.*

35 U.S.C. § 112 requires in relevant part that "[t]he specification shall contain a written description of the invention . . . in such full . . . terms as to enable any person skilled in the art . . . to make and use the same. . . . The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." 3M argues that because, when read literally and without incorporating the hot knife process, neither claim 1 describes an invention which works—that is, binds books, neither satisfies the disclosure requirements of this section.

3M's argument is without merit. There was evidence at trial that at least one method of securing a bind would be obvious to anyone skilled in the art although not specified by either claim 1. Velo-Bind produced evidence that a machine built according to claim 1 of the '117 patent could bind by use of friction fit strips—the male studs

being slightly larger than the corresponding holes in the female strip. Such a machine was demonstrated at trial. In addition, Groswith gave uncontradicted testimony that "any engineer would know that parts can be joined together with friction or what is called interference fit." We take judicial notice that this is correct. The carpenter's nail is very old art indeed.

Moreover, either claim 1 may also be upheld as a subcombination patent that describes a machine which prepares pages for permanent book binding. "It has long been recognized that claims for combinations and also subcombinations may be validly allowed by the patent office . . ., and that a claim need not include all the elements necessary to make up a complete operative device" (citations omitted). *Pursche v. Atlas Scraper and Engineering Co.*, 9 Cir., 1961, 300 F.2d 467, 476 (citing *Deering v. Winona Harvester Works*, 1894, 155 U.S. 286, 302, 15 S.Ct. 118, 124, 39 L.Ed. 153, ("Admitting that additional elements are necessary to render the device operative, it does not necessarily follow that the omission of these elements invalidates the claim, or *that the precise elements described in the patent as rendering it operative must be read into the claim. . . .*" (emphasis added)).

B. *Anticipation and Obviousness.*

3M argues that all of the elements of claim 1 of the '117 and '625 patents were anticipated by other patents, particularly by a patent for a purse making machine known as the Wurzner patent.

We have held that anticipation is a strictly technical defense. *Jones v. Vefo Inc.*, 9 Cir., 1979, 609 F.2d 409, 410. "Unless all of the same elements are found in exactly the same situation and united in the same way to perform the identical function in a single prior art reference there is no

anticipation." *Id.*, quoting *Walker v. General Motors Corp.*, 9 Cir., 1966, 362 F.2d 56, 68. Velo-Bind's expert, Zimmerman, gave extensive testimony on direct and on cross-examination differentiating Velo-Bind's patent claims from those of the Wurzner patent and of the many other patents that 3M advanced as anticipating Velo-Bind's claims. He testified, for example that the Wurzner machine did not provide for a "pressure foot" or "pressure bar" nor for a "means shaped to receive a strip." Indeed, the district judge specifically noted in his memorandum of decision that all of 3M's contentions involving the Wurzner machine "[strain] credulity."

Similarly, we reject 3M's contention that Velo-Bind's mechanical patents—the '117 and '625 patents—were obvious and therefore invalid unless interpreted to include the hot knife binding process. Under 35 U.S.C. § 103 a patent may not be obtained "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious . . . to a person having ordinary skill in the art. . . ."

In *Graham v. John Deere Co.*, 1966, 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545, the Court found that application of § 103 requires several "factual inquiries" into "the scope and content of the prior art . . .; differences between the prior art and the claims at issue . . .; and the level of ordinary skill in the pertinent art. . . ." *Id.* at 17, 86 S.Ct. at 694. The trial court so instructed the jury, and the jury's findings of validity in answer to the court's interrogatories implicitly answered each of these factual questions. *See Control Components, Inc. v. Valtek, Inc.*, 5 Cir., 1980, 609 F.2d 763, 767; *see also Palmer v. Orthokinetics, Inc.*, 9 Cir., 1980, 611 F.2d 316, 319 (precise articulation of *Graham* analysis not necessary where trial court's opinion in context or record reveals *Graham* inquiries were made).

Although the conclusion of validity is ultimately one of law, the jury's findings of fact which underlie this legal conclusion may not be overturned on appeal if supported by substantial evidence. *See Saf-Gard Products, Inc. v. Service Parts, Inc.*, 9 Cir., 1976, 532 F.2d 1266, 1272, *cert. denied*, 1976, 429 U.S. 896, 97 S.Ct. 258, 50 L.Ed.2d 179 (the trier of facts' "*Graham* findings are binding on appeal if not clearly erroneous"). And after reviewing the record before us we find ample support for the jury's conclusion that Velo-Bind's mechanical patents were not obvious. Velo-Bind's expert witness contrasted Velo-Bind's claims with prior art in some detail, and gave his opinion that Velo-Bind's claims were not obvious to a person of ordinary skill in the art. His opinion was buttressed by other evidence in the record, particularly that relating to the brief history of strip binding. This history was one of the "long felt but unsolved needs," failed efforts by both Abilgaard and 3M, and finally a commercially successful breakthrough. *See Graham v. John Deere Co., supra*, 383 U.S. at 17-18, 86 S.Ct. at 693-694.

Indeed, so convincing is this evidence that even if we must test Velo-Bind's patents under the more rigid scrutiny given to combination patents, *see Penn International Industries v. Pennington Corp.*, 9 Cir., 1978, 583 F.2d 1078, 1081-82, we reach the same conclusion of non-obviousness. The evidence in the record indicates that Velo-Bind's patents produced an unusual or surprising—synergistic—result. *See Speed Shore Corp. v. Denda*, 9 Cir., 1979, 605 F.2d 469, 471; *Kamei-Autokomfort v. Eurasian Automotive Products*, 9 Cir., 1977, 553 F.2d 603, 608.

We therefore conclude that the jury's implicit factual determinations under *Graham* were supported by substantial evidence; the district court's refusal to overturn the jury's finding of validity was not in error. However, because we have found that Velo-Bind's design patent was

not infringed, it was error for the district court to enter any judgment as to the validity of this patent. *Mobil Oil Corporation v. Filtrol Corporation*, 9 Cir., 1974, 501 F.2d 282, 293-4.

IV. *Damages.*

35 U.S.C. § 284 provides in relevant part that "the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer." Velo-Bind requested and the jury awarded $3,934,333 in damages. Although the jury did not specify the components of this award, as we read the record, Velo-Bind gave evidence on damages as follows: $645,578 for lost profits on the patented machines including lost sales of machines as well as lost profits on machines that were sold at low prices because of competition with 3M's machines; $268,000 in added costs caused by rushing Model 123 into competition with 3M's machine; and $3,020,725 to compensate for projected lost profits over the eight-year life of a machine on sales of unpatented paper, plastic strips, and book and document covers used in making books. The latter figure includes $415,150 arising from forbearance from price increases on strips which were actually sold because of 3M's competition.

3M first argues that those damages based on lost sales of unpatented supplies should not have been awarded as a matter of law. We agree. As Velo-Bind's damage request indicates, Velo-Bind derives the vast bulk of its profits not from the sale of its machine but from the sale of unpatented supplies used in strip binding—paper, plastic strips and book covers. Velo-Bind argues that although it does not unlawfully tie the sale of these unpatented supplies to the sale of its machine, as a matter of commercial

reality such supply sales do in fact follow upon the sale of a machine. Velo-Bind urges that if it has provided the jury with adequate evidence that these supply sales would have been made, it must be awarded damages for lost supply sales profits under the statute if it is to be fully "compensate[d] for the infringement." (§ 284).

We hold, however, that damages for lost profits on sales of unpatented, consumable supplies are not contemplated by the patent law. As in so much of patent law, we observe here the tension between the law's desire to protect the patentee and its desire to preserve competition.

To begin with, we find Velo-Bind's position anomalous. It concedes that it may not tie the sale of unpatented supplies to the sale of machines. To do so would violate the antitrust laws, e. g., *International Salt Co. v. United States*, 1947, 332 U.S. 392, 68 S.Ct. 12, 92 L.Ed. 20; *Rex Chainbelt, Inc. v. Harco Products, Inc.*, 9 Cir., 1975, 512 F.2d 993, 1000-1003. It would also be a misuse of the patent, precluding its enforcement, e. g., *Leitch Mfg. Co. v. Barber Co.*, 1938, 302 U.S. 458, 58 S.Ct. 288, 82 L.Ed. 371; *Rex Chainbelt, Inc., supra*. Yet Velo-Bind's claim for damages comes close to asking the court to give de facto recognition to a tieing relationship which would be illegal.

Velo-Bind also admits that if 3M had deprived Velo-Bind of virtually all of its profits by simply selling strips, paper, and covers to Velo-Bind's customers, without selling the infringing machine, Velo-Bind would have had no claim for relief under the patent laws. Yet Velo-Bind's request for damages is very similar.

The singularity of Velo-Bind's request is further highlighted by examination of the case law it relies upon for support. Velo-Bind argues that cases applying the "entire market value rule" support its position. *American Safety*

Table Co. v. Schreiber, 2 Cir., 1969, 415 F.2d 373, 377, quoting *Electric Pipe Line, Inc. v. Fluid Systems, Inc.*, D.C. Conn., 1956, 146 F.Supp. 262, 264, states the rule: "where the entire marketable value of the thing sold is dependent on the patent, its entire value is included in computing infringement damages." *See also* 8 Walker, Patents (Deller ed. 1973) § 775. But in none of the cases that Velo-Bind cites has the entire market value rule been applied so as to permit recovery of damages for projected lost sales of consumable, unpatented supplies upon which a patented machine works.

In *American Safety Table, supra*, the court permitted recovery of lost profits from an unpatented table on which a patented die assembly was placed. *But see* Judge Hays' dissenting opinion, *id.* at 383. The court adopted the district court's summary of the set of facts that permitted recovery of this damage element: ". . . defendants' infringing sales of machines and assemblies created the market for the sale of tables separate from assemblies. *This situation is thus analogous to that where tables are sold as parts of complete machines.*" *Id.* at 377 (emphasis added). *Paper Converting Machine Co., Inc. v. FMC Corp.*, E.D.Wis., 1977, 432 F.Supp. 907, 913, is similarly distinguishable. *Electric Pipe Line, Inc. v. Fluid Systems*, 2 Cir., 1957, 250 F.2d 697, awarded damages for infringement of a *process* patent, including lost sales of unpatented component parts of the system. But again the court was not awarding damages for consumable supplies but for the components of a single assembly.

Finally, Velo-Bind relies upon *Leesona Corp. v. United States*, Ct.Cl., 1979, 599 F.2d 958. There, the patent at issue was for a rechargeable battery, and the court awarded damages that included lost sales of unpatented anodes, cathodes, and covers used with the battery. Even so, the

court made clear that it did not view these items as supplies but rather as part of a single package.

These cases do not support Velo-Bind's proposition that damages ought to be awarded for lost sales of unpatented, consumable supplies. Indeed, the one case most clearly on point, *Autographic Register Co. v. Sturgis Register Co.*, 6 Cir., 1940, 110 F.2d 883, 884-885, holds that such damages should not be awarded. In *Autographic Register* the court held that a patentee could not recover damages for lost sales of paper slips designed to be used in a patented register. As in the case here, the patentee derived most of his profit from the sale of unpatented supplies and very little from the sale of the machine. The court concluded, however, that this fact was immaterial and that the patent simply did not cover "perishable and consumable goods" used in the machine. *See also Union Carbide Corp. v. Graver Tank & Mfg. Co.*, 7 Cir., 1960, 282 F.2d 653, 664.

Our view that damages for unpatented supplies should not be awarded is supported by several additional considerations. First, although courts have applied the entire market value rule in certain limited circumstances, this rule is itself an exception to the more general rule that, where the patent creates only part of the profits, damages are limited to that part of the profits, which must be apportioned as between those created by the patent and those not so created. *See Westinghouse Electric & Mfg. Co. v. Wagner Electric & Mfg. Co.*, 1912, 225, U.S. 604, 614-15, 32 S.Ct. 691, 694, 56 L.Ed. 1222. The damages sustained by Velo-Bind are easily apportioned between patented and unpatented lost sales.

Second, there are many elements of damage which may be caused by an infringement and yet which are unrecoverable as a matter of law. Indirect consequential damages are not recoverable, *Walker, supra*, § 755, and lost

supply sales would appear to be a similar sort of damage particularly because Velo-Bind's claim is based on projected sales.

Third, damages based on projected supply sales over an eight year period must be highly speculative. Despite testimony by Velo-Bind's witnesses as to estimated sales, the effect of our decision today must render Velo-Bind's projections uncertain. Those who continue to use the 3M machine may be subject to suit for infringement; those who supply or maintain them may be subject to suit for contributory infringement.

Finally, we do not think that *Dawson Chemical Co. v. Rohm & Haas Co.*, 1980, 448 U.S. 176, 100 S.Ct. 2601, 65 L.Ed.2d 696, affects the decision in this case. In *Dawson* the holder of a process patent on a chemical herbicide sued other manufacturers of the chemical used in the process for contributory infringement under 35 U.S.C. § 271. Emphasizing that the chemical was not a staple product under section 271(c), the Court held that the patentee might maintain the suit even though the chemical itself was unpatented and the company refused to license others to sell it.

Although *Dawson* extends some patent protection to unpatented supplies, it does so only in the particular context of a process patent, an action for contributory infringement under a specific statutory section, and a commodity conceded to be a non-staple product under the section. In light of the Court's traditional concern that protection of a patented invention be strictly limited to the invention, we do not view the opinion in *Dawson* as establishing a rule that damages for unpatented consumable supplies may be collected in suits for direct infringement of a mechanical patent.

Accordingly, we reverse the district court's award of damages for lost profits on sales of unpatented supplies and for infringement of design '195. However, we do not accept 3M's further contention that the other elements of damages in the award must be overturned for lack of sufficient evidence. Velo-Bind's witnesses—primarily officers of the Company—testified at length as to lost sales and profits on the patented machines caused by the infringement as well as to the added costs incurred in rushing Model 123 into competition against 3M's machine. 3M did little at trial to discredit their testimony or to offer contradictory testimony of its own.

Moreover, the estimate that Velo-Bind would have made three of every four 3M sales was not unreasonable, perhaps was even conservative, in light of the admitted fact that strip binding machines appeal to much the same market. Velo-Bind's witnesses gave considerable testimony as to how they reached the three or four figure and as to the factors they had considered. For example, they had taken into account 3M's name, luck, differences in pricing, competition from other companies, and effectiveness of sales personnel. As to the remaining elements of damage, Groswith testified about the nature of the additional costs incurred from rushing production of the Model 123, while 3M's own witness gave testimony tending to support Velo-Bind's claim that it could have raised the price of its machines but for 3M's competition.

Damages "are not rendered speculative or conjectural merely because they cannot be calculated with mathematical exactness." *Marguis v. Chrysler Corp.*, 9 Cir. 1978, 577 F.2d 624, 638, quoting *Loew's, Inc. v. Cinema Amusements*, 10 Cir., 1954, 210 F.2d 86, 95. The jury was fully capable of evaluating the evidence put before it. The district court did not err in refusing to overturn the verdict as to these elements of damage.

V. *Modification of the Injury—No. 79-4584.*

3M moved the district court to modify its injunction against further infringement by 3M "to provide that the manufacture, use and sale of a binding machine which 3M has designed as the Model No. 1000DA . . . does not constitute an infringement of either of the two mechanical patents in suit." The district court denied the motion expressing "reluctance to engage in a summary procedure of this nature" as well as uncertainty "that the Model 1000DA does not infringe the mechanical patents in question."

We believe that the district court was correct in refusing to accept 3M's proposed modification. 3M's request was less one for clarification or modification than one for a summary adjudication of an infringement claim. In refusing the request for modification, the court below relied upon *Atiyeh v. Filtex Corporation*, S.D. Cal., 1955, 130 F. Supp. 196, in which a virtually identical request for modification was made by a patent infringer. There the court found that the request was in essence a disguised action for a declaratory judgment: "Yet, rather than taking the form of an action for declaratory relief, defendant has chosen to present the matter by this summary method. One function of the declaratory judgment act was to afford relief against the peril and insecurity of defying an injunction decree in a patent suit. . . . [The defendant's] method would . . . seem to circumvent the patentee's right to a trial of the fact issues by a jury." *Id.* at 197 (citations omitted). We agree with this reasoning and with the district court's refusal to engage in "a supplemental summary proceeding in a former patent infringement case." *Id.* at 198.

Moreover, although its position is not entirely clear, 3M appears to argue either that its request for modification

was taken under Rule 62(c), F.R.Civ.P., or as an appeal to the district court's inherent authority to modify its injunctions. Under either theory the request appeals to the discretion of the district court. See Rule 62(c), F.R.Civ.P. ("the court in its discretion may . . . modify . . . an injunction during the pendency of the appeal . . ."); *Regal Knitwear Co. v. NLRB*, 1945, 324 U.S. 9, 15, 65 S.Ct. 478, 482, 89 L.Ed. 661 (". . . such relief would be in the sound discretion of the court . . ."). The district court's refusal to grant 3M's request for relief amounting to the summary adjudication of a separate and prospective act of infringement was not an abuse of its discretion.

We need not and do not express any opinion as to whether the proposed machine infringes any of Velo-Bind's claims.

VI. *Treble Damages and Attorneys' Fees—No. 79-3338.*

Velo-Bind cross-appeals from the district court's refusal to increase the damages as provided by 35 U.S.C. § 284—"the court *may* increase the damages up to three times the amount found or assessed" (emphasis added)—or to award attorneys' fees as provided by 35 U.S.C. § 284—"the court in exceptional cases *may* award reasonable attorney fees to the prevailing party." (emphasis added).

Velo-Bind argues, as it must, that the district court's refusal to award these additional sums was an abuse of its discretion. We find no such abuse. The questions of patent validity and infringement in this case are complex and close. The district court's conclusion that 3M's conduct was not so egregious or exceptional as to compel additional damages or attorneys' fees was a proper exercise of its discretion. *See Troy Company v. Products Research Company*, 9 Cir., 1964, 339 F.2d 364, 367-68.

In No. 79-3338 and No. 79-4584 the judgment is affirmed. In No. 79-4448 the judgment is reversed in part and affirmed in part and the matter is remanded for further proceedings consistent wtih this opinion, either by granting a new trial on the issue of damages or by granting a new trial subject to a remittitur of the amount of damages attributable to lost profits upon sales of unpatented paper, plastic strips and covers and for infringement of design '195.

POOLE, *Circuit Judge*, dissenting, in part, and concurring, in part:

The majority's resolution of the infringement-validity problems of this case has a certain neat appeal, particularly since a jury has already passed on some of the underlying issues. Respectfully I must nonetheless dissent. I do so because after applying my own best analysis, I cannot agree that 3-M's binding machine does in fact infringe Velo-Bind's patent unless one gives those claims interpretation so broad that they would be invalid.

A patent presupposes an invention or discovery (35 U.S.C. § 100(a)), and may only be obtained for a "new and useful process, machine, * * * or any new and useful improvement thereof, * * *." 35 U.S.C. § 101. Velo-Bind's primary claims describe a means of securing and inserting plastic pins contained in one strip into complementary holes in an opposing strip. This type of fastening is not by itself new and would not entitle Velo-Bind to a patent. The majority opinion describes the alternate methods of securing such pins in the manner of a ratchet (which is what the 3-M machine does); by the familiar carpenter's practice of driving a tapered nail (which would not be patentable); or by fashioning a rivet head to secure the pins once they have been inserted. The latter is what the Velo-Bind patents do and they do it by the heated knife process. Therein

lies the heart of the matter for without some type of heat the rivet head could not be fashioned and Velo-Bind's patent would not work except by one of the other methods.

Velo-Bind's primary claims are said to deal with shearing the pins after insertion. This alone is neither remarkable or patentable. But the specifications leave in no doubt the fact that the machine is designed not only to cut the excess pins after they have entered the opposing strip, but to soften them and then by force to hammer them into the rivet heads which hold the bound material together. Fashioning these rivet heads is not simply cosmetic; it is the essential aspect of the Velo-Bind machine. By contrast, use of ratchet pins is the essential element of the 3-M machine. 3-M's binding process is complete when the ratchet pins have been inserted and locked. Unlike Velo-Bind's device, it does not require a rivet head for security.

Under 35 U.S.C. § 112, the specifications describe the invention, the manner and process of making and using it, and are required to do so in "such full, clear, concise and exact terms as to enable any person skilled in the art * * * to make use of the same, and [to] set forth the best mode contemplated by the investor for carrying out his invention." Noting that by the use of "means" terminology "a claim shall be construed to cover the corresponding structure, material or acts described in the specifications and equivalents thereof," (Op., p. 968), the majority avoids the logical conclusion that in this case claims-plus-specifications establish the indispensability of some heating element. It states that Velo-Bind's claims merely relate to differential "shear means." It bolsters this position by reliance upon the testimony of Zimmerman, Velo-Bind's witness, to the effect that the "shear means" function, hot or cold, operates simply to cut off the stud ends. (Op., p. 969) I find this testimony acceptable in the face of

the fact that when the actual claims here are read in the light of the specifications it is clear that the heating element is what makes this invention work.

If on the other hand, the patents, claims and specifications are held to embrace *any* mechanism which joins plastic strips by pins and then cuts off the excess length of the pins, there would be nothing to "attain the degree of novelty necessary to establish non-obviousness in the case of a combination." *Lawrence v. The Gillette Company, et al.*, 603 F.2d 68 (9th Cir. 1979). Nor should we look to the claims alone in order to decide infringement, and then look to the claims in the light of their specifications in deciding validity. This court said in *Wire Tie Machinery Co., et al. v. Pacific Box Corp.*, 107 F.2d 54 (9th Cir. 1939):

> Appellant cannot be permitted to construe his claims with reference to his drawings and specifications in order to escape invalidity, and then in the next breath seek to disregard the drawings and specifications in order to spell infringement.

107 F.2d at 55.

The testimony of Zimmerman upon which the majority places reliance, asserted that the function of the "shear means" in the patented machine was simply to enable it to accommodate different thicknesses of bound volumes. In other words, that its effect was merely cosmetic. This is completely inconsistent with the operation of the machine taken in the totality of its claims and specifications.

I concur in the majority's opinion to the extent that it disapproves the award of damages for loss sales of unpatented consumable supplies as well as its affirmance of the trial court's denial of treble damages and attorneys fees but I would reverse the finding of infringement.

UNITED STATES DISTRICT COURT OPINION DENYING 3M MOTION FOR JUDGMENT N.O.V.

(Dated April 5, 1979)

No. C-75-911-WAI(SJ)

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA

VELO-BIND, INCORPORATED, a California corporation,
Plaintiff,

v.

MINNESOTA MINING AND MANUFACTURING COMPANY, a corporation; 3M BUSINESS PRODUCTS SALES, INC., a corporation; RO-BIND CORPORATION, a corporation; RALLY INDUSTRIES, a corporation; and JOE D. GIULIE,
Defendants.

MEMORANDUM OF DECISION ON MOTIONS FOR JUDGMENT NOTWITHSTANDING THE VERDICT AND FOR NEW TRIAL

I have read and considered the extremely voluminous memoranda filed in support of and the memoranda in opposition to defendants' Motions for Judgment Notwithstanding the Verdict and for New Trial. Each of defendants' motions are hereby denied, except with respect to defendant Giulie.

It has been the consistent position of defendants, both at trial and now, that the patents in suit are anticipated by the prior art or that the inventions therein de-

scribed are obvious to one of ordinary skill in the art. It seems to me that the patents are neither obvious nor anticipated. In reaching this conclusion, I place substantial reliance on the testimony of the witness Harris Zimmerman, called as an expert in behalf of plaintiff. Defendants have cited numerous cases effectively stating that the trial court is not bound by expert testimony when considering motions such as these. Such cases as *Globe Linings, Inc. v. City of Corvallis*, 555 F.2d 727 (9th Cir. 1977); *Pederson v. Stewart-Warner Corp.*, 536 F.2d 1179 (7th Cir. 1976); and *Stallman v. Casey Bearing Company*, 244 F.2d 905 (9th Cir. 1957) are typical of cases wherein the trial judge reached a decision with respect to validity and/or infringement without regard to expert testimony which had been elicited in the case. The cases which have just been cited are by no means the only ones relied upon by defendants in advancing their contentions. In fact, on this point, defendants have cited numerous cases and those mentioned above are typical and illustrative of defendants' contentions. I do not quarrel with the notion that the trial judge may, if the facts and law applicable to the case are otherwise clear and obvious, reach a conclusion independent of expert testimony. However, in this case, I consider expert testimony to be helpful and find that the expert opinion elicited in trial to be well reasoned, rendered by a qualified witness, and as far as I am concerned, highly probative of the issues in support of which it was offered. I therefore conclude that upon the evidence before it, the jury properly found that the 117 patent, the mechanical patents, and the design patent are both valid and infringed.

There was sufficient evidence to support the award of damages rendered by the jury. While it is true that Messrs. Groswith and Benoit predicated their conclusions

with respect to the number of lost sales occasioned by the infringement upon an assumption, the predicates upon which these witnesses reasoned appears to me to be reasonably sound and based upon reasoned conclusions in part resulting from the examination of sales records. It was not contested at trial that the devices of plaintiff and defendant were at the time in issue the only strip book binders in the market. Thus, it is reasonable to conclude, as the jury apparently did, that persons desiring this sort of equipment would not go into other markets to obtain binding devices based upon another technology.

In support of its motion for new trial, defendants cite other purported insufficiencies of proof with respect to the issue of damages and specifically relating to lost profits from sales of supplies, damages for reduced prices, and damages by reason of additional costs incurred in the development and marketing of the model 123 machine. The matters argued in defendants' memorandum were relevant to the issue, were before the jury, and were decided by the jury. The evidence was not insufficient or wanting as a matter of law.

The question of entitlement to damages resulting from the loss of sales of unpatented supplies as distinguished from those of the patented devices was correctly resolved by the jury under the Court's instruction, and provides no cogent consideration in the resolution of these motions. It is difficult to visualize any viable market for the supplies here in issue separate from their use in the patented machine. Cf. *American Safety Table Company v. Schreiber*, 415 F.2d 373 (2nd Cir. 1969). To argue that the evidence reveals a possible use of the binding strips in connection with the Wurzner machine hardly establishes a marketable value independent of the patented device and strains

credulity, as does every other contention in this case involving the Wurzner machine.

Defendants contend that plaintiff's evidence relating to defendants' efforts to develop a binding machine prior to its acquisition of the accused machine was improperly admitted and was prejudicial. The evidence complained of was relevant and probative to the theory of plaintiff's case, and its exclusion was not required by the provisions of Fed. R. Civ. P. 403.

Defendants complain of the instruction given which relates to "paper patents." The instruction clearly by its terms confines its effect to the question of obviousness as distinguished from anticipation. The authorities relied upon by defendants, except one, deal with the question of anticipation, which the instruction does not. Defendants also contend that the Court should have given proposed instructions 1A, 2A and 4A with respect to combinations. As pointed out in Plaintiff's Memorandum in Opposition, pp. 33 and 34, the jury was adequately instructed in that regard.

I am of opinion that there is insufficient evidence upon which a reasonable juror could find that defendant Giulie was the alter ego of Rally/Ro-Bind or of defendant 3M, or that there is sufficient evidence of his individual inducement of infringement. The motion for judgment in his favor in spite of the verdict of the jury is granted, without costs.

Otherwise, the Motion for Judgment Notwithstanding the Verdict of defendants other than Giulie are denied as are their Motions for New Trial.

/s/ WILLIAM A. INGRAM
United States District Judge

UNITED STATES DISTRICT COURT JUDGMENT

(Filed May 17, 1979)

Civil Action No. C-75-0911 WAI (SJ)

UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA

VELO-BIND, INCORPORATED, a California corporation,
Plaintiff,

vs.

MINNESOTA MINING AND MANUFACTURING COMPANY, a corporation; 3M BUSINESS PRODUCTS SALES, INC., a corporation; RO-BIND CORPORATION, a corporation; RALLY INDUSTRIES, a corporation, and JOE D. GIULIE,
Defendants.

JUDGMENT

This action came on for trial before the Court and a jury, the Honorable William A. Ingram, District Judge, presiding; the issues having been duly tried; the Court having directed a verdict in favor of plaintiff and against defendants on the defense of unclean hands in the prosecution of the patents in suit; and the jury having duly rendered its verdict in favor of plaintiff Velo-Bind, Incorporated and against defendants Minnesota Mining and Manufacturing Company, a Delaware corporation, 3M Business Products Sales, Inc., a Delaware corporation, Ro-Bind

Corporation, formerly a California corporation, Rally Industries, formerly a California corporation, and Joe D. Giulie in the sum of $3,934,333; defendants, and each of them, having moved the Court for judgment notwithstanding the verdict and for new trial and the Court, except as to defendant Joe D. Giulie, having denied each of said motions by its Memorandum of Decision on Motions for Judgment Notwithstanding the Verdict and For New Trial; plaintiff having moved the Court for a permanent injunction and the Court having made and filed its Findings of Fact and Conclusions of Law; Order for Permanent Injunction granting said motion and issuing said permanent injunction; and, plaintiff having moved the Court for increased damages and attorneys' fees and the Court having denied said motions,

IT IS HEREBY ORDERED, ADJUDGED AND DECREED as follows:

1. This Court has jurisdiction over the parties and over the subject matter in issue.

2. Claims 1, 2 and 3 of United States Letters Patent No. 3,608,117, Claims 1 and 7 of United States Letters Patent No. 3,756,625 and United States Letters Patent No. D227,195 are good and valid in law.

3. Plaintiff Velo-Bind, Incorporated is possessed of the entire right, title and interest in and to said Letters Patent Nos. 3,608,117, 3,756,625 and D227,195, together with the right to sue for and collect for damages for infringement thereof and has been possessed thereof continuously since the issuance of each of said Letters Patent.

4. Defendants Minnesota Mining and Manufacturing Company, 3M Business Products Sales, Inc., Ro-Bind Corporation and Rally Industries have each infringed Claims 1, 2 and 3 of Letters Patent No. 3,608,117, Claims 1 and 7

of Letters Patent No. 3,756,625 and Letters Patent No. D227,195 by making and selling the machine in evidence as the 3M Model 1000.

5. That plaintiff Velo-Bind, Incorporated recover from defendants Minnesota Mining and Manufacturing Company, 3M Business Products Sales, Inc., Ro-Bind Corporation and Rally Industries, jointly and severally, the sum of $3,934,333, with interest thereon at the rate of 7% commencing November 20, 1978, and its costs of action.

6. Pursuant to the Memorandum of Decision on Motions For Judgment Notwithstanding The Verdict and For New Trial, filed April 5, 1979, that plaintiff take nothing against defendant Joe D. Giulie and that said defendant Joe D. Giulie not recover costs against the plaintiff.

7. Based upon and pursuant to the Findings of Fact and Conclusions of Law on Motion for Permanent Injunction; Order for Permanent Injunction, filed May 11, 1979, that defendants Minnesota Mining and Manufacturing Company, a Delaware corporation, 3M Business Products Sales, Inc., a Delaware corporation, Ro-Bind Corporation, formerly a California corporation, and Rally Industries, formerly a California corporation, and each of them, and their respective agents, subsidiaries, affiliated companies and employees, be and they hereby are permanently enjoined from directly or indirectly infringing or inducing or contributing to the infringement of Claims 1, 2 and 3 of United States Letters Patent No. 3,608,117, Claims 1 and 7 of United States Letters Patent No. 3,756,625 and United States Letters Patent No. D227,195, and particularly from manufacturing, selling, leasing, advertising, offering for sale, transferring or conveying any machine substantially of the design of that in evidence as the 3M Model 1000 or any other machine which has been found to infringe or

which embodies any invention defined in any of the claims of any of said patents.

The manufacture, use and sale of binding strips for use in those 3M Model 1000 machines already sold prior to the date of the Order for Permanent Injunction, filed May 1, 1979, is not prohibited by the injunction awarded.

8. Each party hereto shall bear its own attorneys' fees and no attorneys' fees are awarded to any party.

/s/ WILLIAM A. INGRAM
United States District Judge

ORDER OF THE UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT DENYING REHEARING

(Filed July 14, 1981)

No. 79-4448, No. 79-3338

UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

VELO-BIND, INCORPORATED, a California Corporation,
Plaintiff-Appellee and Cross-Appellant,

vs.

MINNESOTA MINING AND MANUFACTURING COMPANY, a Corporation; 3M BUSINESS PRODUCTS SALES, INC., a Corporation; RO-BIND CORPORATION, a Corporation; and RALLY INDUSTRIES, a Corporation,
Defendants-Appellants and Cross-Appellees.

ORDER

Before: DUNIWAY, SNEED and POOLE, *Circuit Judges*

The petition of defendants-appellants for a rehearing and the petition of appellee and cross-appellant for a rehearing are each hereby denied.

STATUTE INVOLVED

PATENTS

U.S.C. 35 § 112

§ 112. Specification

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to

enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

A claim may be written in independent or, if the nature of the case admits, in dependent or multiple dependent form.

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

A claim in multiple dependent form shall contain a reference, in the alternative only, to more than one claim previously set forth and then specify a further limitation of the subject matter claimed. A multiple dependent claim shall not serve as a basis for any other multiple dependent claim. A multiple dependent claim shall be construed to incorporate by reference all the limitations of the particular claim in relation to which it is being considered.

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

As amended July 24, 1965, Pub.L. 89-83, § 9, 79 Stat. 261; Nov. 14, 1975, Pub.L. 94-131, § 7, 89 Stat. 691.

Sept. 28, 1971 W. H. ABILDGAARD ET AL 3,608,117

MACHINE FOR BINDING AND PUNCHING SHEETS

Filed Nov. 10, 1969 5 Sheets-Sheet 1

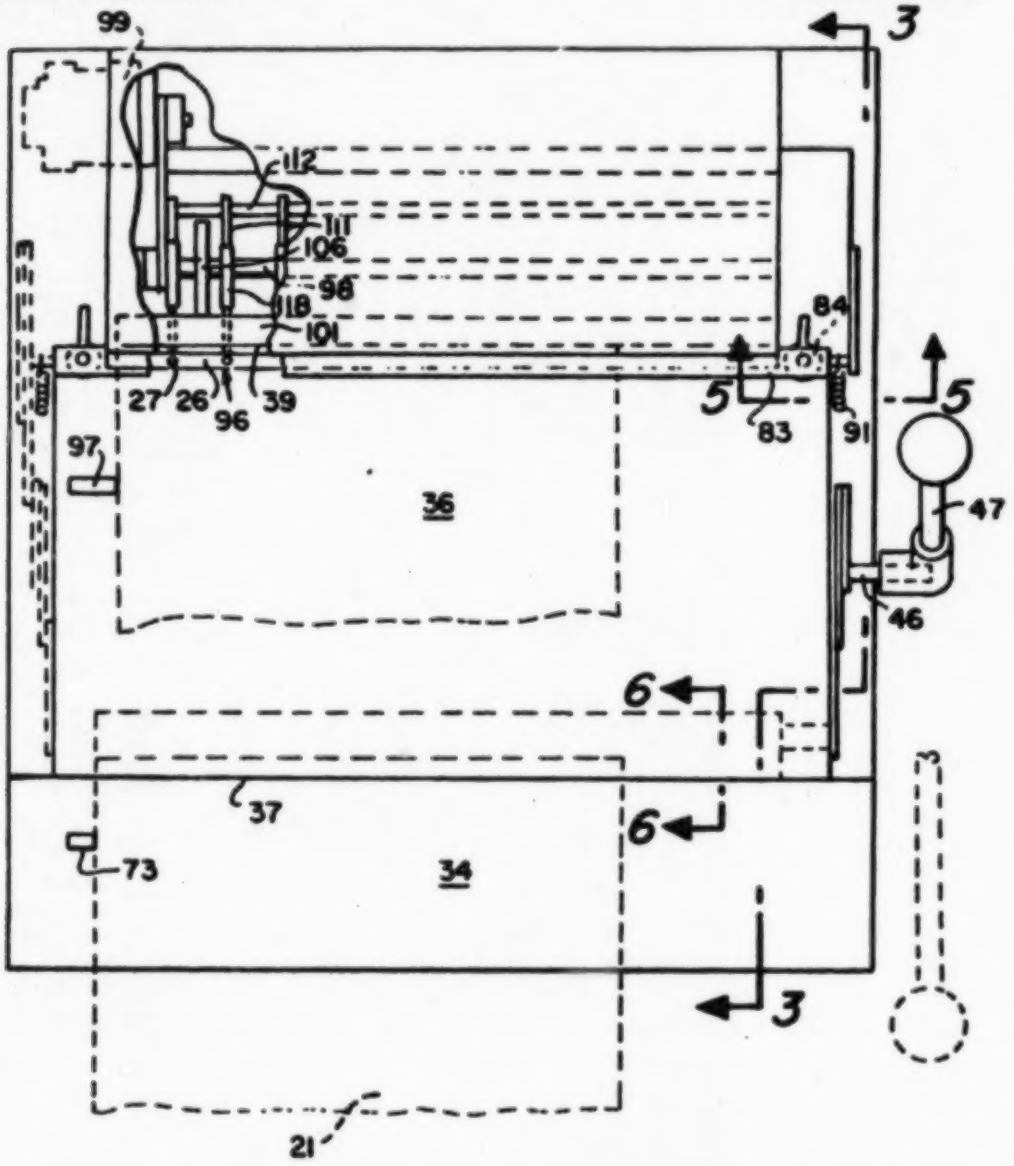

FIG. 1.

INVENTOR.
WILLIAM H. ABILDGAARD
CHARLES T. GROSWITH III
BY DALNY TRAVAGLIO
Julian Caplan
ATTORNEY

Sept. 28, 1971 W. H. ABILDGAARD ET AL 3,608,117

MACHINE FOR BINDING AND PUNCHING SHEETS

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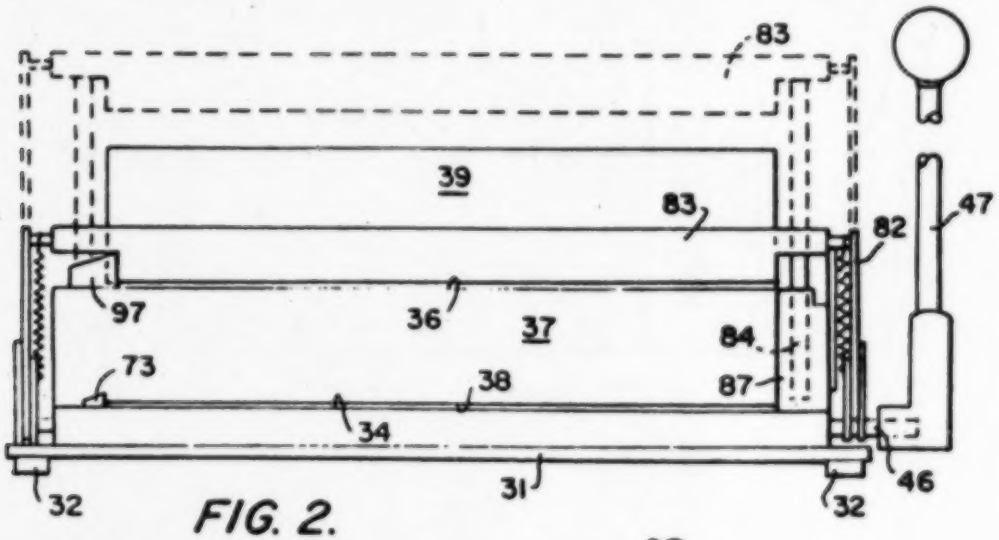

FIG. 2.

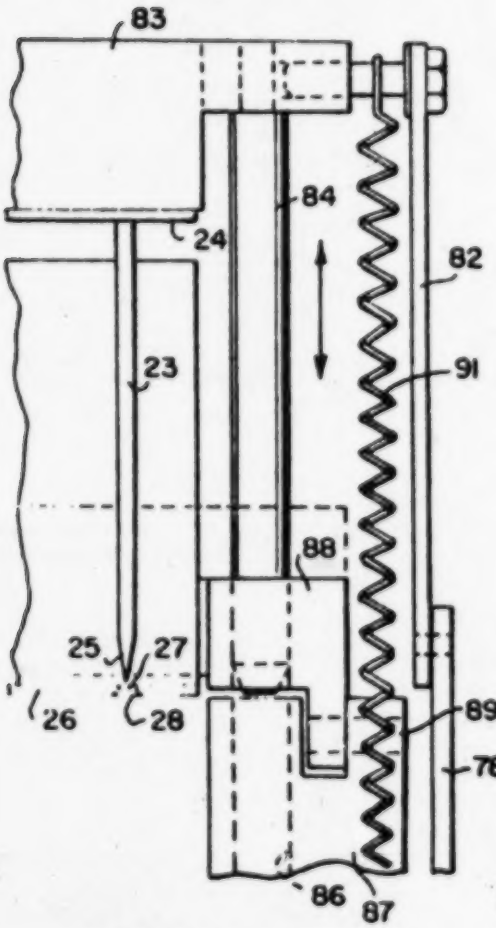

FIG. 5.

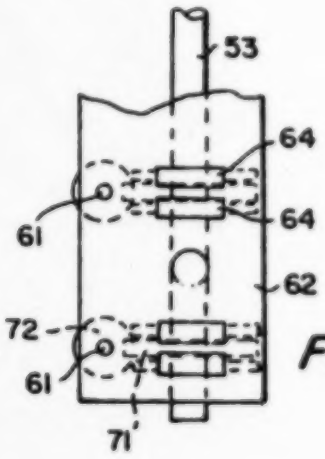

FIG. 7.

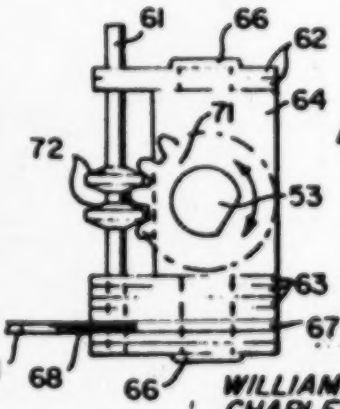

FIG. 6.

INVENTOR
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Sept. 28, 1971 W. H. ABILDGAARD ET AL 3,608,117

MACHINE FOR BINDING AND PUNCHING SHEETS

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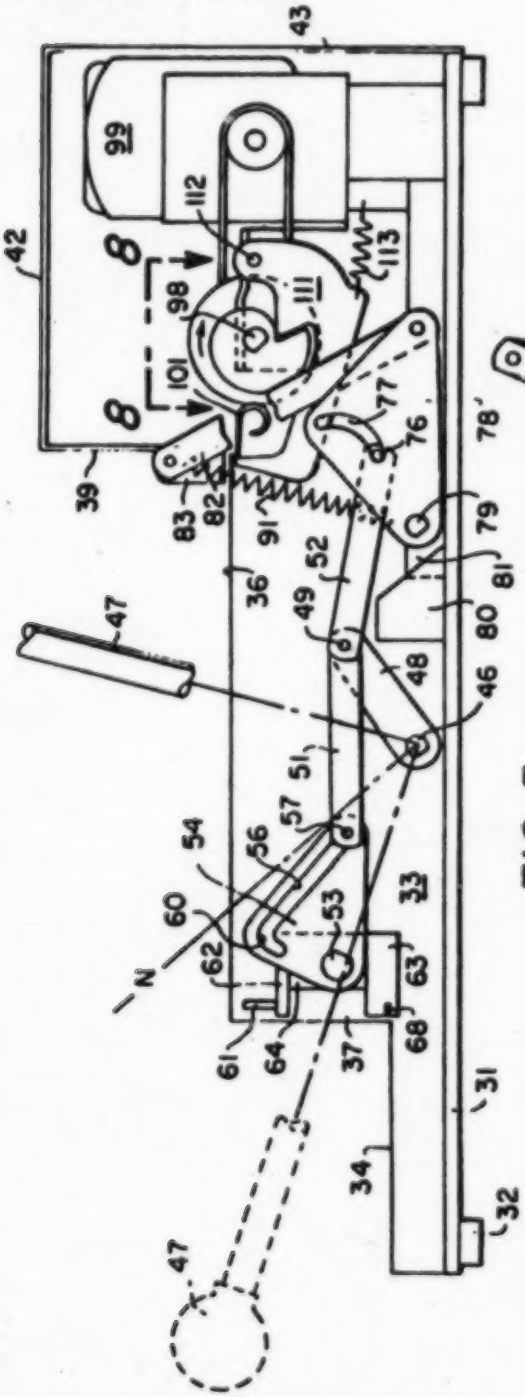

FIG. 3.

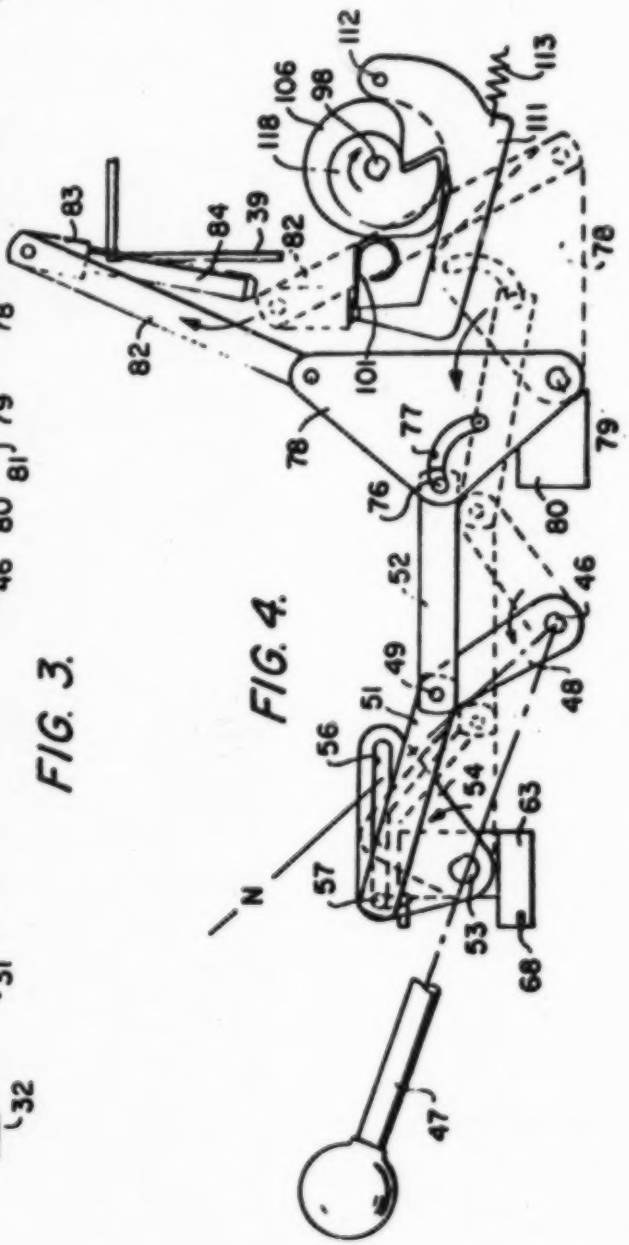

FIG. 4.

INVENTOR.
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Sept. 28, 1971 W. H. ABILDGAARD ET AL 3,608,117

MACHINE FOR BINDING AND PUNCHING SHEETS

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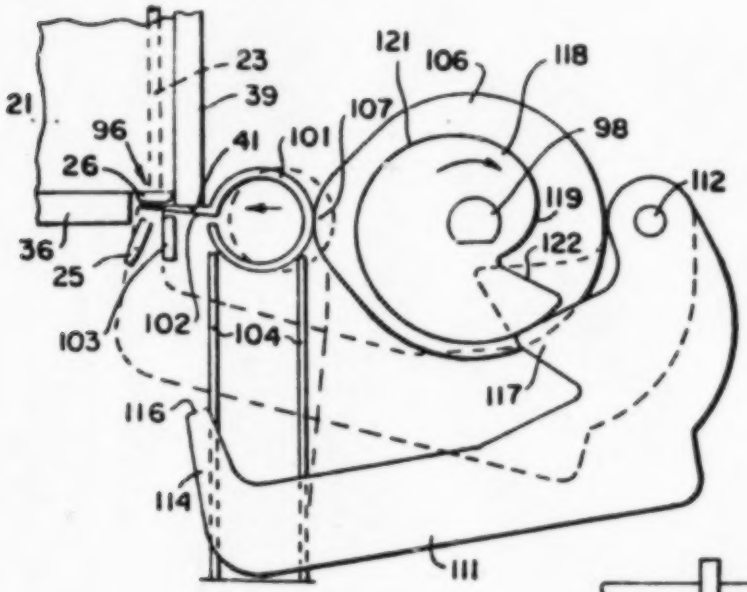

FIG. 9.

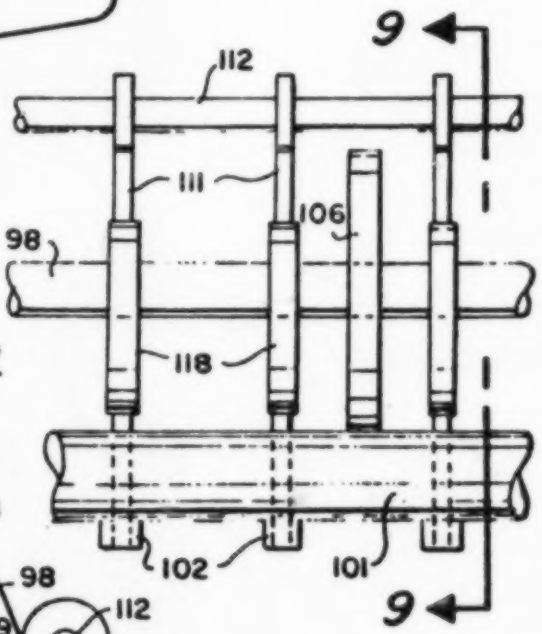

FIG. 8.

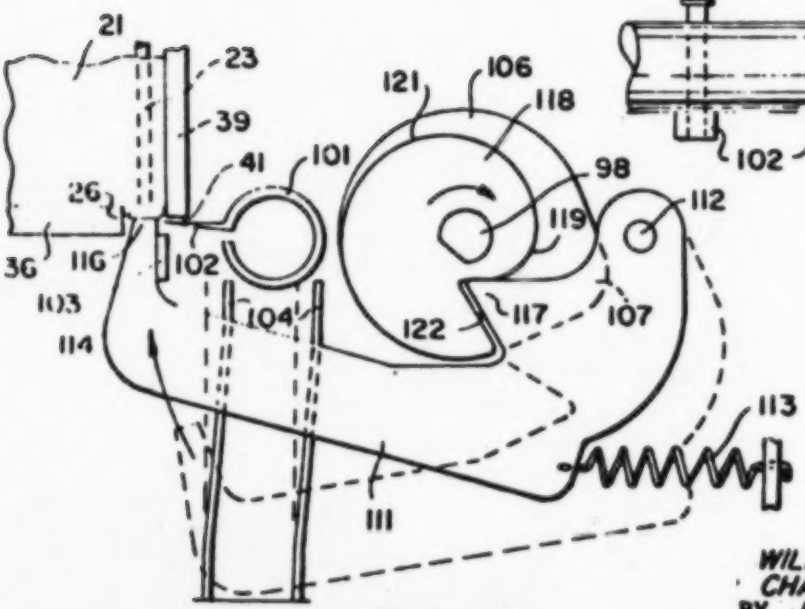

FIG. 10.

INVENTOR.
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Sept. 28, 1971 W. H. ABILDGAARD ET AL 3,608,117

MACHINE FOR BINDING AND PUNCHING SHEETS

Filed Nov. 10, 1969 5 Sheets-Sheet 5

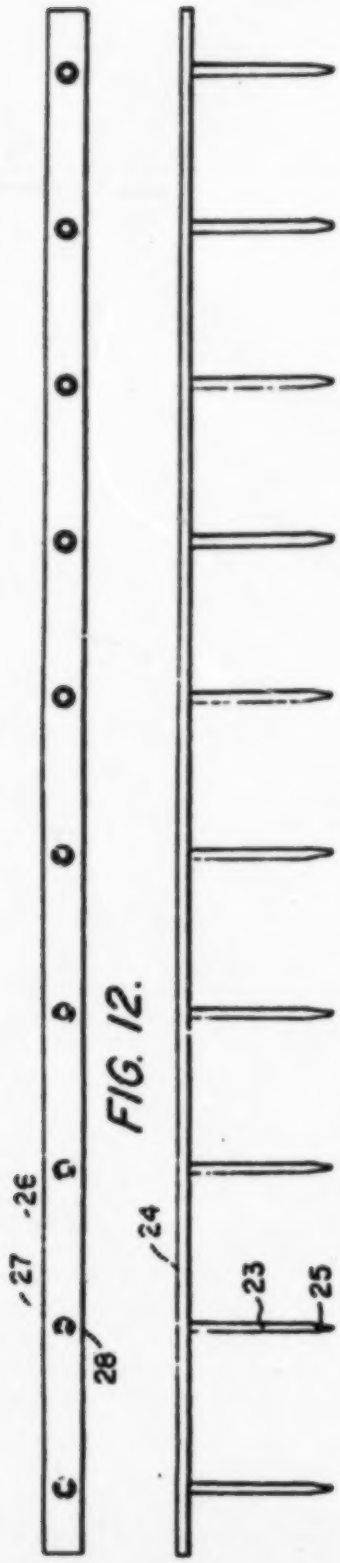

FIG. 12.

FIG. 11.

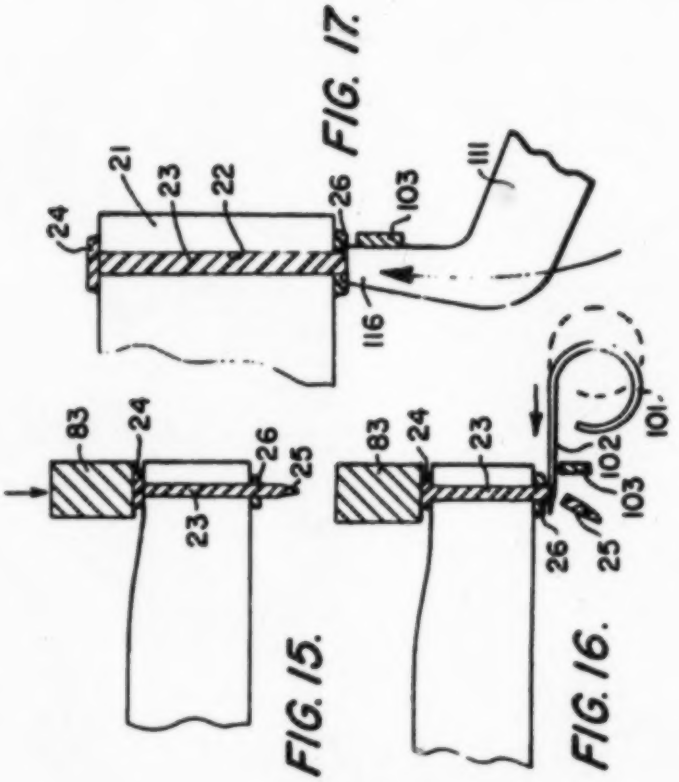

FIG. 17.

FIG. 15.

FIG. 16.

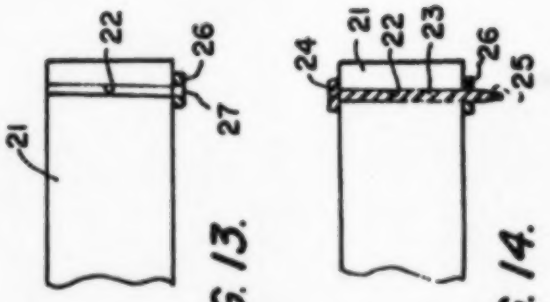

FIG. 13.

FIG. 14.

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ATTORNEY

United States Patent Office

3,608,117

Patented Sept. 28, 1971

3,608,117

MACHINE FOR BINDING AND PUNCHING SHEETS

William H. Abildgaard, Los Altos Hills, Charles T. Groswith III, Los Altos, and Dalny Travaglio, Kensington, Calif., assignors to Abildgaard Laboratories, Mountain View, Calif.

Continuation-in-part of application Ser. No. 799,045, Feb. 13, 1969. This application Nov. 10, 1969, Ser. No. 875,126

Int. Cl. B42b 5/08; B42d 1/06; B42c 19/00

U.S. Cl. 11—1 10 Claims

ABSTRACT OF THE DISCLOSURE

An office-type machine is provided for first punching holes in sheets and then binding the sheets to form a book. Used with the machine are two plastic strips, one having longitudinally spaced upstanding studs and the other having holes corresponding in spacing to the studs. The machine has a punch to prepare the sheets. Punched sheets are positioned in the machine on top of the second strip and the studs of the first strip are inserted through the holes in the paper and the holes in the second strip. The strips with the paper therebetween are compressed together. Excess lengths of the studs are cut off by hot blades and rivet-like heads are formed on the severed ends of the studs by heading arms which strike the molten ends of the studs and lock the strips and interposed sheets in assembled position.

This application is a continuation-in-art of copending application Ser. No. 799,045 filed Feb. 13, 1969.

This invention relates to a new and improved apparatus for binding apertured sheets to produce a book.

A feature of the present invention is the fact that it is a machine of a size suitable for use in a business office which both punches and binds sheets together, using two plastic strips, one having spaced studs which project through the holes in the sheets and the other being formed with apertures to receive the ends of the studs. When the two strips are pressed together with the sheets to be bound interposed and with the studs fitting through the holes in the sheets, a ladder-like arrangement of the strips is obtained. The excess length of the strips are sheared off by the application of heat, leaving the ends of the studs in softened condition. The ends are struck with hammer-like arms which form heads permanently binding the sheets together.

A feature of the invention is the fact that it accepts a wide variety of types of material. Thus ordinary paper which has been punched or drilled adjacent one of its margins may be used or the machine may punch the paper as a preliminary to the binding operation. On the other hand, looseleaf, previously-punched paper may be used. It is sometimes desirable to re-bind books or to bind assembled pluralities of books, pamphlets, catalogs and the like. For this operation, the material is punched or drilled adjacent one margin thereof, in a separate machine. The versatility of the apparatus, as far as the variety of material accepted, is one of the features of the invention.

Another feature of the invention is the fact that a range in thickness of pages is accommodated. The studs of the first strip heretofore mentioned are of extended length so as to fit through a relatively thick book. However, the apparatus shears off the excess length of the studs where less than the maximum length is required. The effectiveness of the binding operation is relatively independent of the thickness of the papers involved. The apparatus will accept a variety of sizes of sheets within limits.

Another feature of the apparatus is the fact that the

sheets are tightly pressed together and then locked in place uncompressed condition.

Still another feature of the invention is the fact that by mechanical linkages hereinafter described in detail, a single operating handle may be used to operate the punch which punches the sheets and also to compress the strips together with the pages interposed therebetween.

Another feature of the invention is the fact that a timing cycle is achieved which shears the excess stud lengths and then hammers the still soft stud ends to form heads.

Another feature of the invention is the fact that it is easily operated by relatively untrained personnel. Little physical effort is required to operate the machine and the operation is rapid.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a top plan view partly broken away in section of the apparatus which is the subject of this invention.

FIG. 2 is a front elevational view thereof showing the device in compressed condition in solid lines and in extended position in dotted lines.

FIG. 3 is a sectional view taken substantially along the line 3—3 of FIG. 1.

FIG. 4 is a view similar to FIG. 3 showing elements of the device in other positions of adjustment.

FIG. 5 is an enlarged, fragmentary, sectional view taken substantially along the line 5—5 of FIG. 1.

FIG. 6 is an enlarged, fragmentary, sectional view taken substantially along the line 6—6 of FIG. 1.

FIG. 7 is a fragmentary, top plan view of the structure of FIG. 6.

FIG. 8 is an enlarged plan view of a portion of the elements of the machine which shear and head the studs.

FIG. 9 is a sectional view taken substantially along the line 9—9 of FIG. 8.

FIG. 10 is a view similar to FIG. 9 showing the parts in another position in the cycle of operation.

FIG. 11 is an elevational view of one of the strips used in practice of the invention.

FIG. 12 is a plan view of another of said strips.

FIGS. 13 to 17, inclusive, are fragmentary, schematic views showing steps in the cycle of assembling the strips and sheets, compressing the same, severing the studs and heading the severed ends.

The apparatus hereinafter described is used to bind together either temporarily or permanently pluralities of sheets of paper or the like which are designated in the accompanying drawings generally by reference numeral 21. Cover sheets for the front and back of the book may also be used. Each sheet is formed with a series of spaced holes 22 along one margin thereof, the spacing between the holes corresponding to the spacing of studs 23 of first strip 24, hereinafter described. The holes 22 are preferably round and made by means of a paper punch which is a part of the apparatus herein described. Occasionally, however, it is desirable to bind pre-punched pages or to re-bind a book such as a paper bound book. Thereupon the holes 22 of such pages may be drilled or otherwise formed by separate apparatus. The dimensions of the sheets 21 which are accepted by the apparatus hereinafter described, are subject to considerable variation, the apparatus being made large enough to accommodate a range of sizes. The thickness of the book which is to be bound is likewise subject to variation between a very few sheets and a thickness which is within the limits of the lengths of the studs 23 of the strip 24.

First strip 24 is preferably rectangular being about

¼" wide and 1/16" thick. The length is approximately equal to that of the sheets 21. Spaced along the center of one surface of the strip 24 are circular cross-section integral studs 23 formed with points 25 at their outer ends. The studs 23 are preferably between 3/32" and ⅛" in diameter and may be in length up to about 3".

The second strip 26 also is approximately ¼" in width and 1/16" in thickness and is formed with a series of holes 27 spaced in distances corresponding to the spacing of the studs 23. Preferably, a countersink 28 is formed in each hole 27 along one surface of the strip 26.

The strips 24, 26 are preferably molded or otherwise formed of a plastic material. One suitable plastic is a rigid polyvinyl chloride which is thermoplastic. Another suitable thermoplastic is high-impact polystyrene.

The machine which is the subject of this invention, is preferably suitable for installation on an office desk or the like and hence is relatively small and compact. A base plate 31 is supported above the table or other surface on which the machine is installed by pads 32. Projecting upward along either side of the base are sides 33. Extending between the sides at the front of the machine is a horizontal lower platen 34 used to support sheets 21 during the punching operation. Spaced rearwardly of and elevated above lower platen 34 is horizontal upper platen 36 used to support sheets 21 during the shearing and heading of studs 23. Vertical panel 37 formed with an opening 38 to receive sheets 21 extends down from upper platen 36 to lower platen 34. Behind upper platen 36 is a vertical panel 39, also formed with slotted openings 41 and above panel 39 is a top 42 which connects to back 43.

Extending horizontally transversely of the machine adjacent base plate 31 and approximately midway between the front and the rear of the machine is main shaft 46. An external operating handle 47 performs a variety of operations depending upon the direction and the extent which it is moved. Directing attention to FIGS. 3 and 4, the neutral position of handle is shown by line N. Connected to shaft 46 is link 48 which is pinned by pin 49 to front and rear links 51, 52. Spaced rearwardly of panel 37 and slightly above the level of lower platen 34 is punch shaft 53 which carries a rocker arm 54 formed with an elongated slot 56 which receives pin 57 on the outer end of forward link 51. The left-hand end of slot 56 is formed with an arcuate extension 60. In neutral position, pin 57 is at the upper end of the straight stretch of slot 56. When handle 47 is pulled from the neutral position of FIG. 4 in a counterclockwise direction to the solid line position of FIG. 4, pin 57 first proceeds to the end of arcuate slot 60 and thereafter rocker arm 54 is turned in a counterclockwise direction and this turns punch shaft 53 through about thirty degrees in a counterclockwise direction. When handle 47 is returned to neutral position, rocker arm 54 is returned to the dotted line position of FIG. 4. The arcuate extension 60 positively turns shaft 53 to starting position. Shaft 53 is preferably spring-loaded to assist the return to neutral position. When handle 47 is turned in clockwise direction beyond neutral, pin 57 slides to the bottom end of slot 56 providing a lost motion connection.

The punching operation and apparatus is shown particularly in FIGS. 6 and 7. For each hole 22 to be punched in sheets 21, there is a punch rod 61 which reciprocates vertically, being guided by upper laminae 62 and lower laminae 63 which are apertured to receive rods 61. Laminae 62 consist of apertured sheet metal strips extending the width of the machine. Lower laminae 63 are similar strips. At intervals are vertical spacers 64 which are bonded to the laminae by rivet beads 66. The third lowermost lamina is a spacer lamina 67 being shorter than the others providing space 68 for the insertion of the sheets 21 to be punched. The location of the spacer 67 is at the level of the lower platen 34. Between the vertical spacers 64, for each punch rod 61 is a segmental pinion 71 which is fixed to punch shaft 53. Each

punch rod 61 has fixed thereto rack elements 72 which mesh with the teeth of the segmental pinion 71. The rack elements 72 may consist of several disks fixed to rod 61. Preliminary to punching, the edges of sheets 21 are inserted through opening 38 and into spacer 68. The left hand edge of each sheet is squared against side guide 73 which projects up from the level of the lower platen 34 and the inner edges of the sheets are pushed against the spacer lamina 67. When the punch shaft 53 is oscillated by pulling handle 47 from the neutral position of FIG. 4 to the solid line position thereof, the punch rods 61 are depressed and the ends of the punch rods shear against the second lowermost apertured lamina 63, punching holes 22 in the sheets 21. In order to reduce the force required for punching, pinions 71 may be staged about shaft 53 so that only a few of rods 61 contact the paper simultaneously and other rods contact the paper serially.

Directing attention again to FIGS. 3 and 4, the rear link 52 carries a pin 76 which fits in arcuate lost motion slot 77 in triangular second rocker arm 78 which is pivoted about pivot 79 attached to an upward projection 81 of base 31. An elongated lever 82 is pivoted to the corner of rocker arm 78 opposite pivot 79 and the outer end of link 82 is pinned to pressure bar 83. On each side of the machine an alignment pin 84 depends from bar 83. See FIG. 5. Alignment pin 84 fits in a vertical socket 86 in block 87 fixed to base plate 31, the lower end of the pin being chamfered to facilitate insertion in the alignment socket. An apertured guide fitting 88 is pivoted by pin 89 to block 87. When alignment pin 84 is released from its socket 86, it remains within fitting 88 and its movement is restricted thereby. When alignment pin 84 is depressed as hereinafter explained, fitting 88 guides the end of alignment pin 84 into its socket 86.

The linkage is such that when handle 47 is in neutral position, pin 76 is at the right hand end of slot 77 as viewed in FIG. 4, but arm 78 is in solid line position. During the punch operation pin 76 slides in arcuate slot 77 and rocker arm 78 remains stationary against stop 89. When handle 47 is moved from neutral position in clockwise direction, however, pin 76, being seated at the right end of slot 77, pivots rocker arm 78 from the solid line position of FIG. 4 to the dotted line position thereof. In the solid line position of arm 78 in FIG. 4, lever 82 raises pressure bar 83 and lifts alignment pin 84 out of its socket 86. This tilts pressure bar 83 rearwardly behind panel 39 for a purpose which hereinafter appears. Clockwise movement of handle 47 from neutral or solid line position to the dotted line position of FIG. 4 or solid line position of FIG. 3 pulls alignment pin 84 down into socket 86 and pulls bar 83 downwardly. Coil springs 91 which interconnect bar 83 and shaft 79 apply a downward pressure on pressure bar 83.

The upper platen 36 is formed with a transverse depression 96 immediately before opening 41 and immediately in front of panel 39 and into this depression the second strip 26 is installed with the countersunk holes 28 downwards. The punched sheets 21 are then installed on top of the second strip 26, their side edges being squared against side guide 97 and their inner edges panel 39. The holes 22 in the paper and holes 27 in the second strip are thereby aligned. Studs 23 are then inserted through the holes until the first strip 24 is on top of the top sheet 21. Since studs 23 may be of extended length, the capacity of the machine is increased by permitting the upper transverse pressure bar 83 to tilt rearwardly as is shown in solid lines in FIG. 4. As handle 47 is moved from the neutral position shown in FIG. 3 to the solid line position of FIG. 3, pressure bar 83 first returns to horizontal position by reason of guide fittings 88 directing the lower ends of the alignment pins 84 in the alignment socket 86 and the lever 82 next pulls the pressure bar 83 downwardly as guided by the alignment pins 84. Springs 91 press bar 83 against first strip 24 and compress sheets 21 between the first and second strips. (See solid line posi-

tion of FIG. 3.) As a safety measure, the movement of bar 83 may be damped by a dashpot or other means (not shown). The excess length of studs 23 project below the bottom surface of second strip 26. Springs 91 hold the book in place during the severing and heading operations, which are next described. Thereafter handle 47 is returned to neutral and pressure bar 83 to the position shown in FIG. 4.

Extending transversely about at the level of upper platen 36 is a stud severing and heading cycling shaft 98 which is driven through one revolution by an electric motor 99 when the operator presses a button. Extending transversely horizontally of the machine is a hollow tube 101 which receives a heating element (not shown) which is thermostatically controlled to heat tube 101 and also the horizontally reciprocating knife blades 102 which project horizontally forwardly therefrom through opening 41 in front panel 39. On their forward movement, the blades cut off the excess lengths of the studs 23 slightly below the level of second strip 26 (see FIG. 9.) On the retractive stroke (dotted line position of FIG. 9), the blades are retracted behind front panel 39 and thus do not constitute a hazard to personnel. Below the level of the blades 102 is an extension 103 of front panel 39 which serves as a wiper to strip off excess plastic which tends to cling to blades 102. Tube 101 is supported at each end by leaf springs 104 which are fixed at their lower ends and which bias tube 101 to rearward or dotted line position of FIG. 9. On timing shaft 98 are a plurality of cams 106 having high dwells 107. When the high dwells 107 contact tube 101 as shaft 98 turns in clockwise direction, the tube is forced forwardly (to the left in FIG. 9). After shaft 98 has turned so that high dwells 107 are no longer in contact with tube 101, springs 104 return to the blades to retracted position.

For each stud 23 there is a heading arm 111 which performs a hammering function. The heading arms 111 are pivoted about shaft 112 which is parallel to and behind timing shaft 98. Compression springs 113 bias the arms 111 in a clockwise direction (see FIG. 10). Each arm 111 has a forward projecting extension 114 which has an upward turned striking portion 116 in alignment with stud 23. Each arm 111 also is formed with a cam following finger 117. For each arm 111 there is a cam 118 on timing shaft 98. Each cam 118 has a low dwell 119 or idling portion, then a constantly increased radius portion 121 and finally a trigger or substantially radial stretch 122 which joins the low dwell portion 119. The cam follower finger 117 of each arm 111 engages cam 118. As shaft 98 turns, cam 118 moves arm 111 from the dotted line position of FIG. 9 to the solid line position thereof (which also is a movement from the solid line position of FIG. 10 to the dotted line position thereof). The downward or counterclockwise movement of arm 111 compresses spring 113 and hence when shaft 98 reaches the position shown in solid lines in FIG. 10, arm 111 springs upward from the dotted line position to the solid line position with considerable force. Blades 102 have heated the ends of stud material 23 during the time that the studs are being cut and the stud ends are still quite soft. Hence when the striking ends 116 of the arms 111 forcibly contact the plastic stud, heads are formed on the stud and the material is forced into the countersunk portions of second strips 26. The volume of material in the arms 111 operates as a heat sink which cools the studs 23 causing them to become non-plastic as the cams 118 travel through their low dwell portion 119. The arms 111 are then retracted to the dotted line position of FIG. 10 and the cycle is ready for repetition.

Directing attention now to FIGS. 13–17, the method of operation of the machine is best illustrated. Preliminarily, the sheets 21 are inserted in whatever quantity the punch will accept in spacer 67, the holes 22 to be punched being properly located by the inner edges of the paper contacting the spacer 67 and the margins of the pages contacting the side guide 73. The handle 47 is pulled from neutral position forwardly causing the punch rods 61 to punch holes in the paper and then returned to neutral position. The punching operation may be repeated several times until all of the sheets 21 which are to form the book have been punched. It will be understood, as has already been explained, that holes 22 may be pre-punched or may be drilled where necessary.

The second strip 26 is then installed in the depression 96 in the rearward end of top platen 36 with the countersunk surfaces of the holes lowermost. The sheets 21 are then piled on top of platen 36 and square against the back panel 39 and side guide 97. The holes 22- 27 in the sheets and lower strip are thereby aligned. Thereupon the upper strip 24 is installed with studs 23 extending down through the holes 22 in the sheets 21 and through the holes 27 in the second strip 26 and projecting below the second strip (see FIG. 14).

With the handle in neutral position, the pressure bar 83 is tilted backward permitting the installation of first strips 24 with elongated studs 23 and with a considerable thickness of material to be bound. As the control handle 47 is moved rearwardly in a clockwise direction the pressure bar 83 is brought to horizontal position by reason of the fact that the pivoted guide fittings 88 direct the lower ends of the alignment pins 84 into the vertical guide sockets 86.

Continued movement of handle 47 pulls pressure bar vertically downwardly under the influence of springs 91, forcing the studs 23 down and compressing sheets 21 between the lower 26 and upper 24 strips (see FIG. 15). Handle 47 remains in rearward position, the extent of movement depending upon the thickness of sheets to be handled in the maximum position. A control light indicates whether the heating elements have heated the blades 102 to a sufficiently high temperature to perform their function. When this is indicated, the operator pushes a button which cycles motor 99 to turn shaft 98 through one revolution. At the start of the cycle, blades 102 are retracted and the heading arms 111 are also in the retracted position. As shaft 98 turns, cams 106 force tube 101 forwardly against the force of springs 104 causing blades 102 to cut off the ends of the studs 23 a short distance below the bottom surface of the second strip 26, the severed ends dropping into a receptacle (not shown). The blades 102 not only sever studs 23 but also heat the lower ends thereof so that they are soft. Blades 102 then retract under the action of springs 104 as shaft 98 continues to revolve. The continued turning of shaft 98 further depresses the arms 111 against the force of springs 113 until the trigger portion 122 of cam 118 passes the cam follower fingers 117 of arms 111 and thereupon the springs 113 forcibly impel the arms 111 in an upward, clockwise direction. The working ends 116 of arms 111 forcibly strike the soft ends of the studs 23, forming heads thereon and forcing the material to fill the countersunk portions 28 of the holes 27. The arms 111 remain in contact with studs 23 a sufficient length of time to cool the same, whereupon the arms 111 are retracted to initial position and the timing cycle is ready for repetition. Handle 47 is returned to neutral position and the bound book is removed.

What is claimed is:

1. Apparatus for binding sheets together with the use of a first strip, a plurality of studs projecting from and spaced longitudinally relative to said first strip and a second strip formed with apertures spaced longitudinally of said second strip at intervals complementary to said studs, said apparatus comprising a frame having means shaped to receive one said strip, a platen table adjacent said means to support apertured sheets, a pressure foot formed to engage the other of said strips, cooperating means on said frame and said pressure foot to move said pressure foot toward said first-mentioned means to bring said strips together with said studs projecting through said apertures,

and shear means to cut off the ends of said studs projecting through said second strip.

2. Apparatus according to claim 1 in which said cooperating means comprises actuating means mounted on said frame, means articulately connecting said actuating means and said pressure foot, and cooperating guide means on said frame and said pressure foot, said actuating means forcing said pressure foot in a direction perpendicular to said platen to compress said strips toward each other.

3. Apparatus according to claim 2 in which said guide means disengage when said pressure foot is positioned remote from said platen and said means articulately connecting said actuating means and said pressure foot tilts said pressure foot at an angle relative to said platen, and second guide means for reengaging said first-mentioned guide means when said last-mentioned means moves said pressure foot toward said platen.

4. Apparatus according to claim 1 in which said shear means comprises a plurality of blades, means reciprocating said blades in a direction transverse to said studs and heating means to heat said blades.

5. Apparatus according to claim 1 which further comprises a plurality of heading means mounted on said frame and heading actuating means for moving said heading means against the ends of studs cut off by said shear means to form heads on said ends, securing said studs and said strips in assembled position.

6. Apparatus according to claim 5 which further comprises heating means to heat and make plastic said ends, whereby said heading actuating means upset said plastic ends.

7. Apparatus according to claim 5 in which said heading means comprises a plurality of levers pivotally mounted on said frame having cam follower fingers, a shaft, cams on said shaft engaged by said fingers, resilient means biasing said levers toward said ends, said cams shaped to force said levers against the force of said springs away from said ends and then rapidly to release said levers for hammer-like blows of said heading means against said ends, and means for turning said shaft.

8. Apparatus according to claim 7 which further comprises second cams on said shaft engaging said shear means, said second cams forcing said shear means to cut off said ends prior to said heading means being driven against said ends.

9. Apparatus according to claim 8 which further comprises heating means to heat said shear means to soften said ends as said ends are cut off.

10. Apparatus according to claim 1 which further comprises means on said frame to deform the cutoff ends of said studs to hold said studs and said second strip bound together.

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LAWRENCE CHARLES, Primary Examiner

U.S. Cl. X.R.

281—21

United States Patent [19]

Abilgaard et al.

A44

[11] **3,756,625**

[45] **Sept. 4, 1973**

[54] **METHOD AND APPARATUS FOR BINDING BOOKS**

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[73] Assignee: **Velo-Bind Inc., Sunnyvale, Calif.**

[22] Filed: **Apr. 15, 1971**

[21] Appl. No.: **134,359**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 799,045, Feb. 13, 1969, Pat. No. 3,596,929, Continuation-in-part of Ser. No. 875,126, Nov. 10, 1969, Pat. No. 3,608,117.

[52] U.S. Cl. ..... 281/25, 11/1 R, 281/21

[51] Int. Cl. B42b 1/00, B42c 19/00

[58] Field of Search ..... 11/1 R, 1 M, 1 B; 281/21, 25

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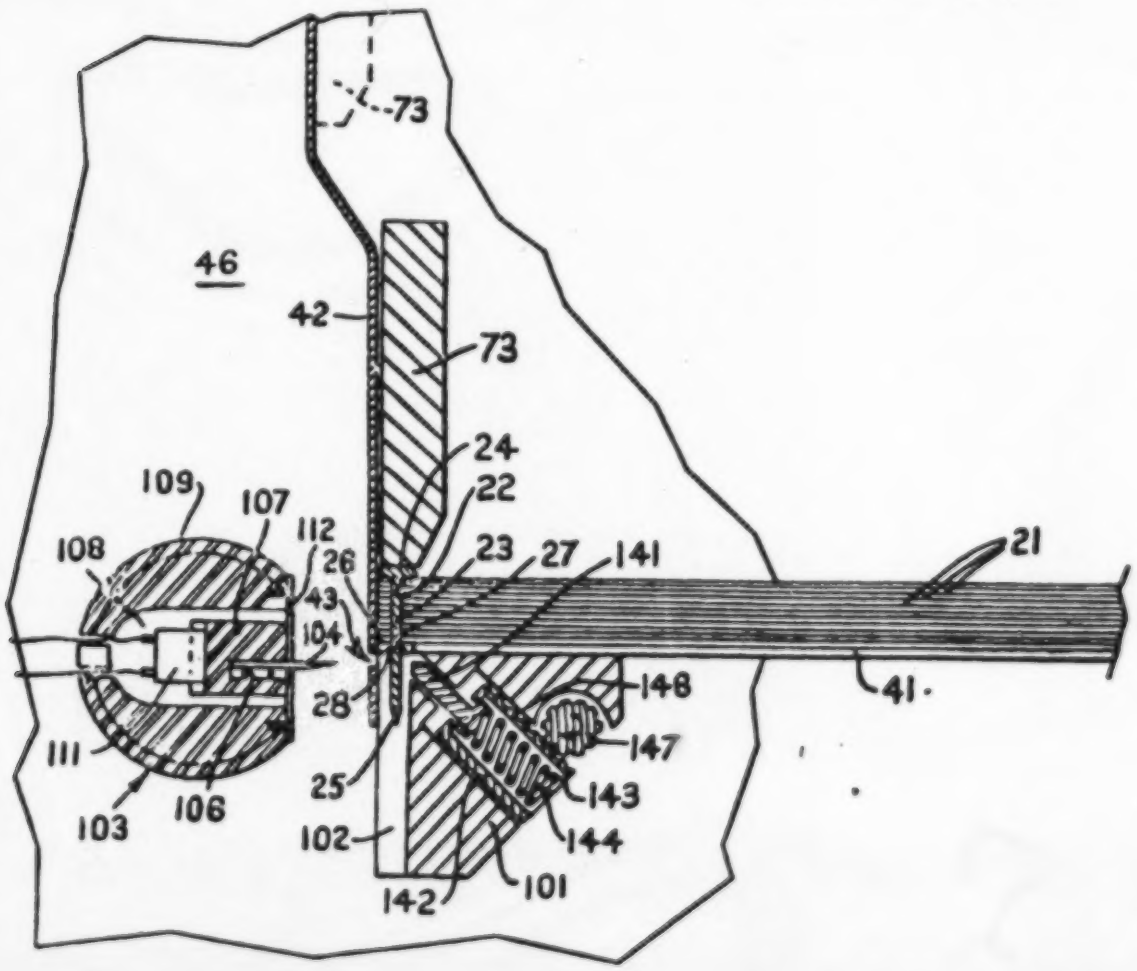
Primary Examiner—Lawrence Charles
Attorney—Julian Caplan

[57] **ABSTRACT**

A machine is provided for first punching holes in sheets and then binding the sheets to form a book. Used with the machine are two thermo-plastic strips, a first having longitudinally spaced, upstanding studs and the second having holes corresponding in spacing to the studs and preferable formed with counterbores on one surface. The machine has a punch to punch the sheets. Punched sheets are placed on a platen on top of the second strip and the studs of the first strip are inserted through the holes in the paper and the holes in the second strip. A pressure foot is mechanically moved to apply pressure on the first strip to compress the paper between the two strips with predetermined force and this pressure is maintained until completion of the binding. Excess stud length protruding below the second strip is cut off a short distance below the second strip by heated knives. The knives are then moved upward, deforming the stud stubs into the counterbores in the second strip to form heads. Upon withdrawal of the knives, cooling and forming fingers are forced against the heads to shape and cool same. When the heads have hardened, the fingers are withdrawn and the pressure foot withdrawn.

18 Claims, 15 Drawing Figures



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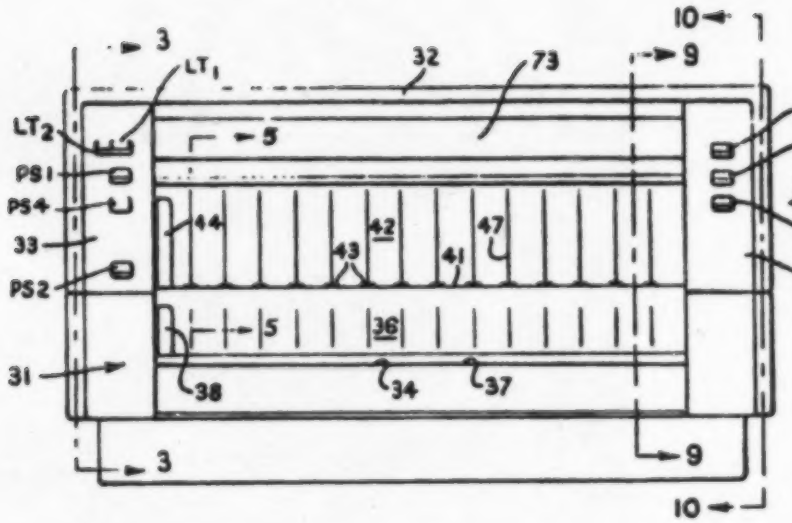

FIG. 1

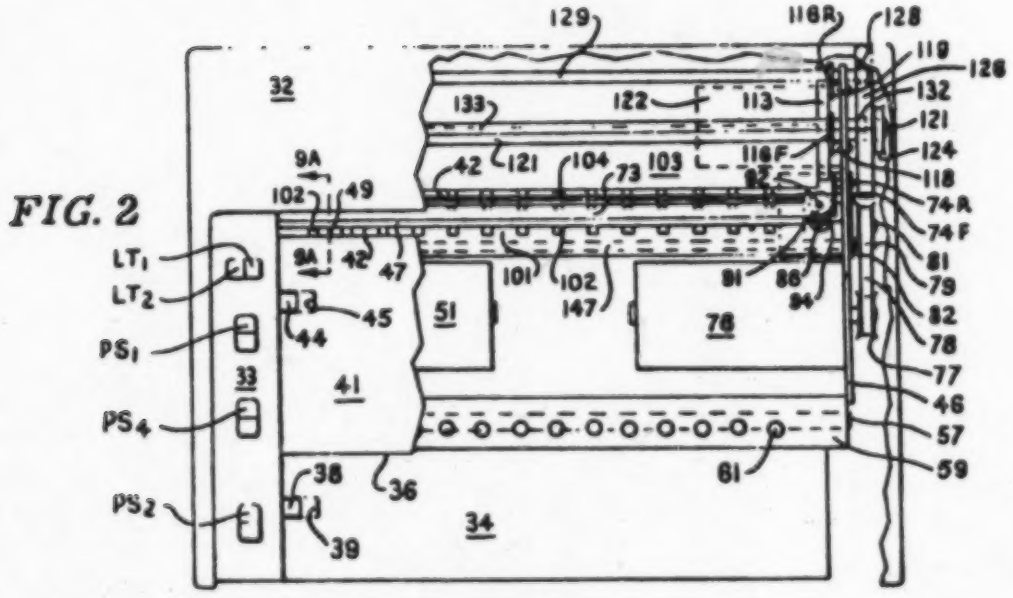

FIG. 2

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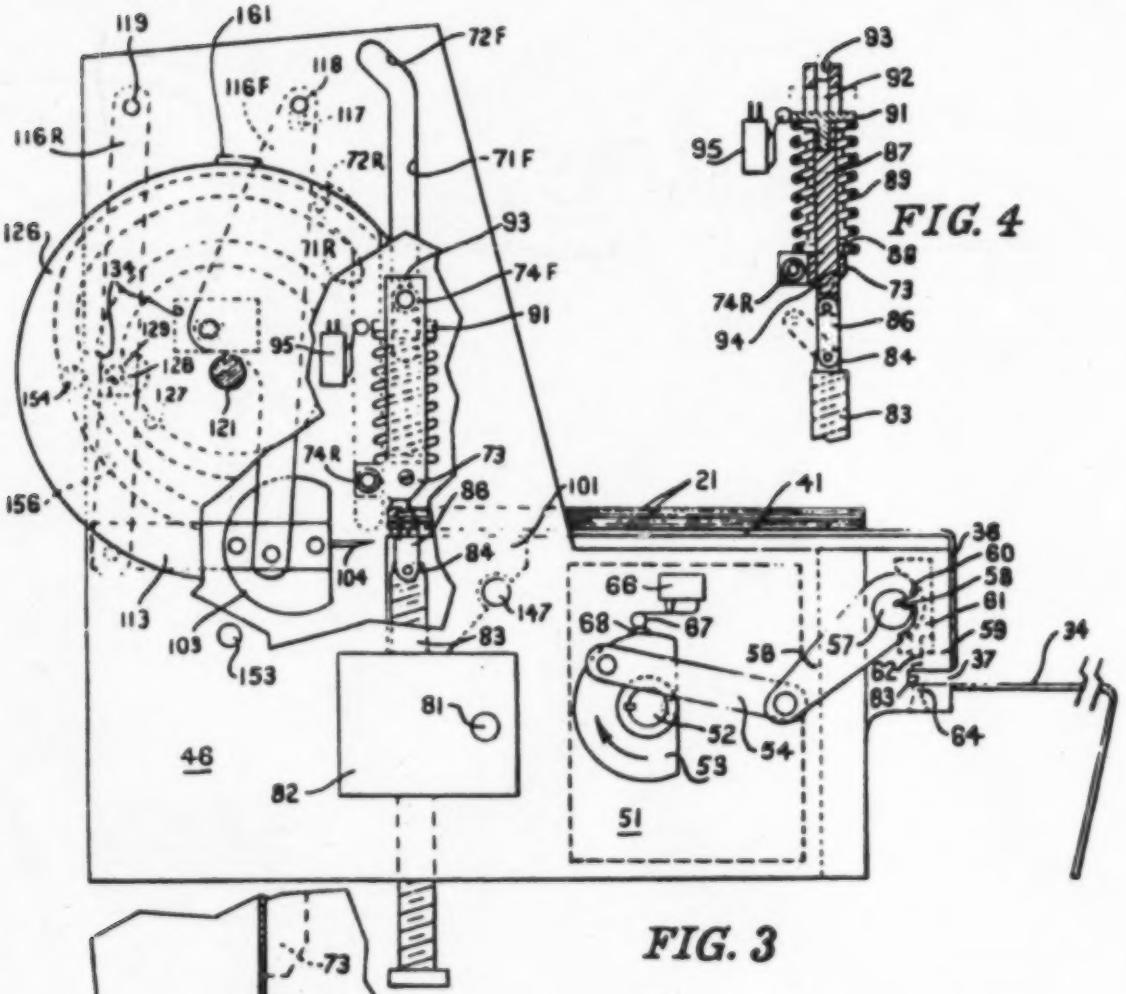

FIG. 4

FIG. 3

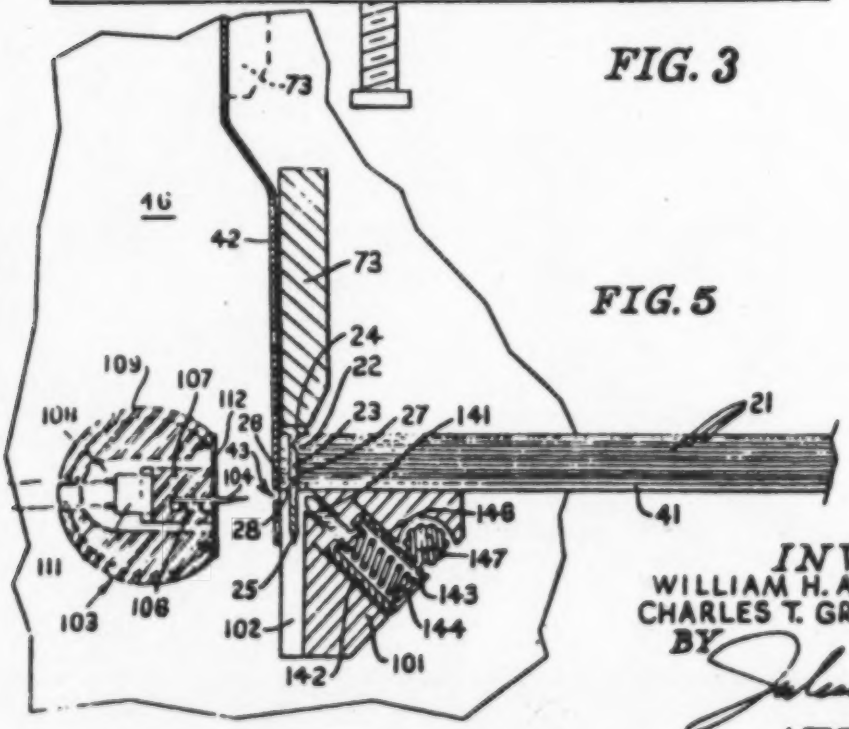

FIG. 5

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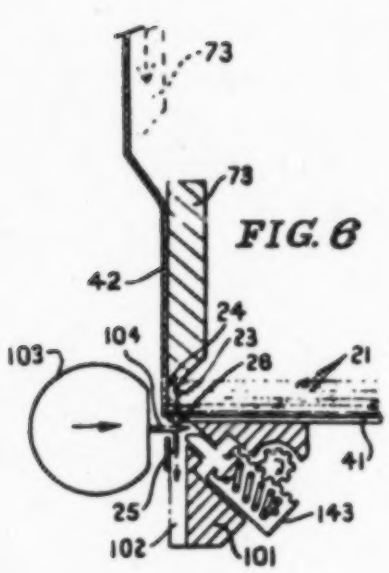

FIG. 6

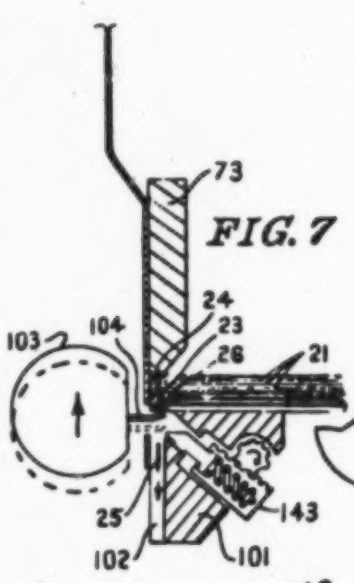

FIG. 7

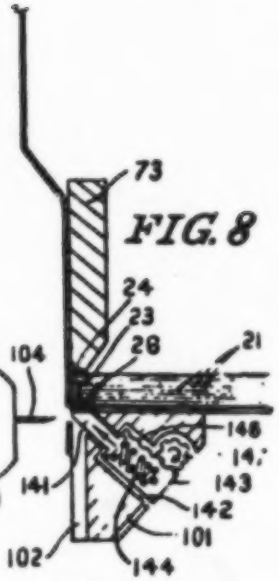

FIG. 8

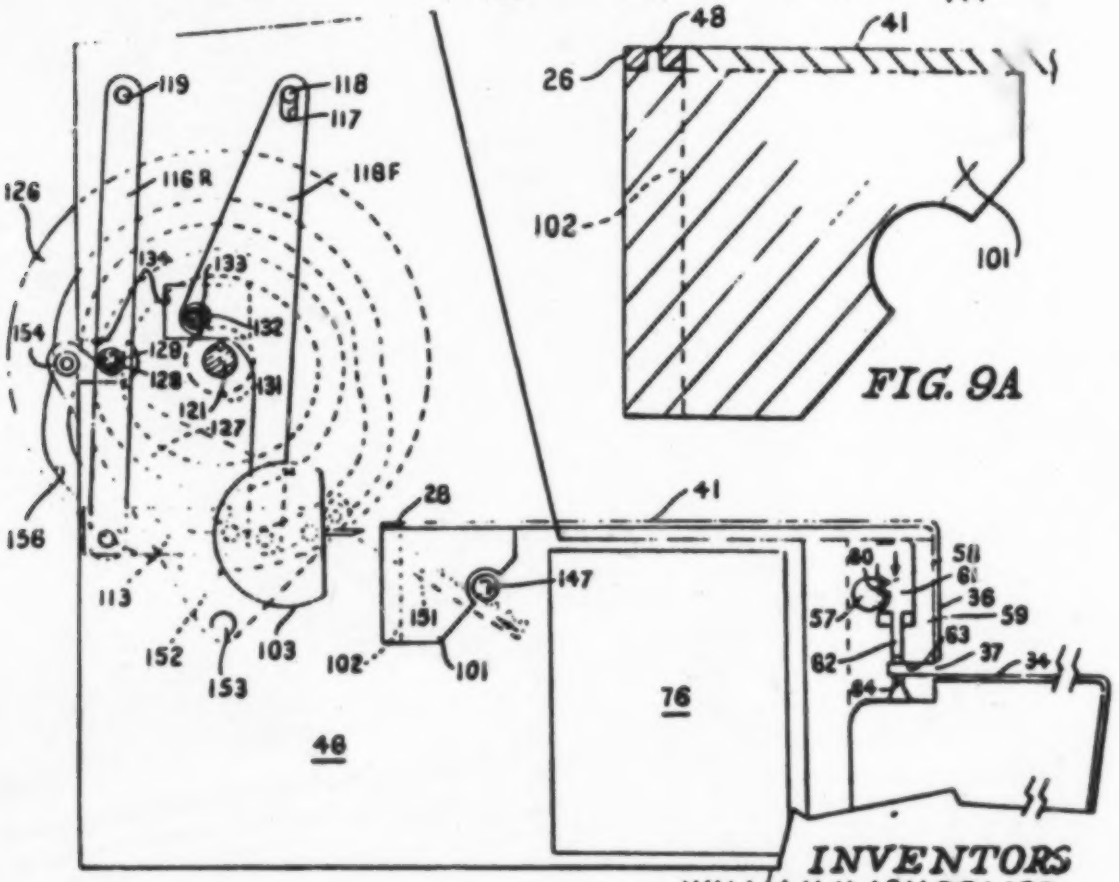

FIG. 9A

FIG. 9

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FIG. 11

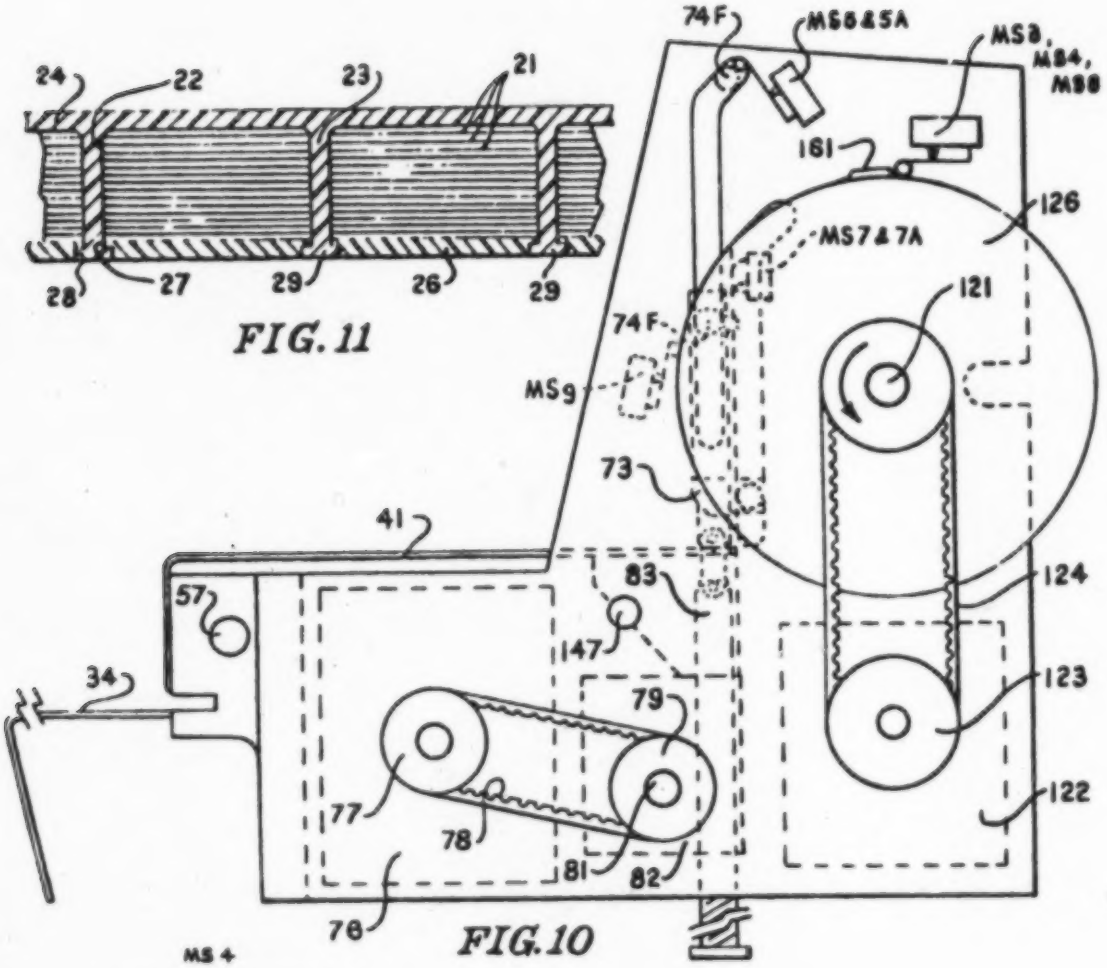

FIG. 10

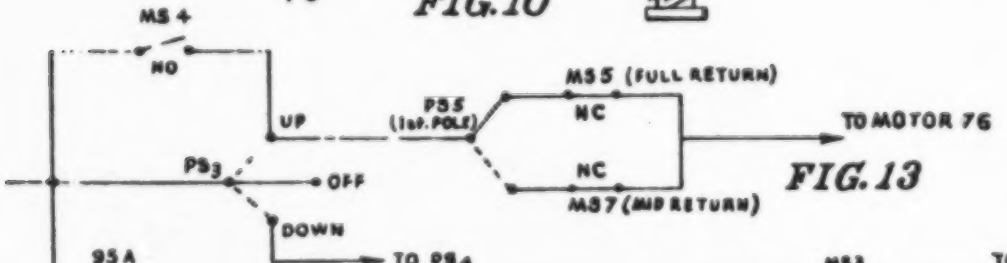

FIG. 13

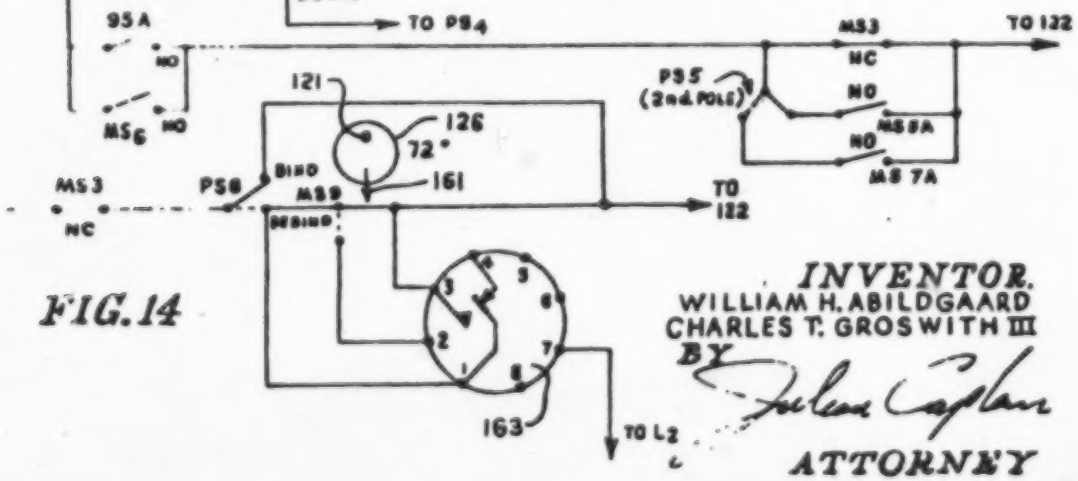

FIG. 14

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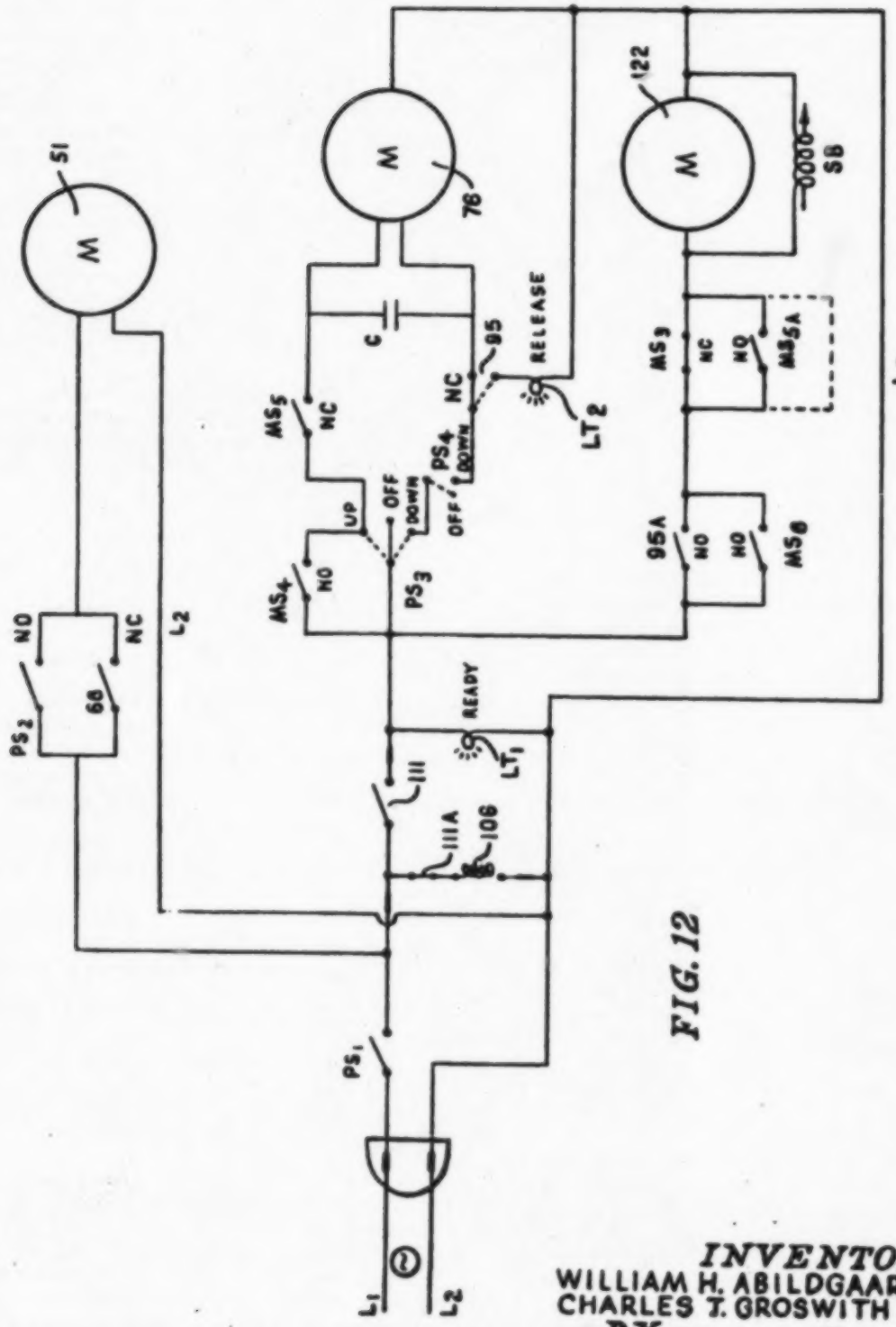

FIG. 12

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METHOD AND APPARATUS FOR BINDING BOOKS

This application is a continuation-in-part of copending applications Ser. No. 799,045, filed Feb. 13, 1969, now U.S. Pat. No. 3,596,929 and Ser. No. 875,126, filed Nov. 10, 1969, now U.S. Pat. No. 3,608,117. In the latter copending application, joint inventor Dalny Travaglio was not a party to that portion of the subject matter which is common to this application.

This invention relates to a new and improved apparatus and method for binding apertured sheets to produce a book.

A feature of the present invention is the fact that it provides a machine of a size suitable for use in a business office which both punches and binds sheets together, using two plastic strips, one having spaced studs which project through the holes in the sheets and the other being formed with holes to receive the ends of the studs. When the two strips are pressed together with the apertured sheets to be bound interposed and with the studs fitting through the apertures in the sheets, a ladder-like arrangement of the strips is obtained. The excess lengths of the studs are sheared off, leaving the stubs of the studs in softened condition. The stubs are pressed with fingers which form heads and cool the same, permanently binding the sheets together between the strips.

A feature of the invention is the fact that it accepts a wide variety of types of sheet material. Thus ordinary paper which has been punched or drilled adjacent one of its margins may be used or the machine may punch the paper as a preliminary to the binding operation. On the other hand, looseleaf, previously-punched paper may be used. It is sometimes desirable to re-bind books or to bind assembled pluralities of books, pamphlets, catalogs and the like. For this operation, the material is punched or drilled adjacent one margin thereof, in a separate machine. The versatility of the apparatus, as far as the variety of material accepted, is one of the features of the invention.

Another feature of the invention is the fact that a range in thickness of books is accommodated. The studs of the first strip heretofore mentioned are of extended length so as to fit through a relatively thick book. However, the apparatus shears off the excess length of the studs where less than the maximum length is required. The effectiveness of the binding operation is relatively independent of the thickness of the book involved. The apparatus will accept a variety of sizes of sheets, within limits.

Another feature of the apparatus is the fact that the sheets are tightly pressed together and then locked in place in compressed condition.

Still another feature of the invention is the provision of a mechanism, preferably motor operated, which applies predetermined pressure to press the pages of the book together.

Another feature of the mechanism is the fact that the foot which applies the pressure is so guided that at its extreme open position it is displaced rearwardly, permitting insertion of plastic strips even at the extreme thickest limit of the books being handled.

Another feature of the invention is the provision of a cam system which mechanically and electrically times the cutting of the studs, the pressing of the studs into rough shapes for heads and then presses the heads into the final form and cools them so that the plastic sets into a permanent binding.

Another feature of the invention is the fact that a timing cycle is achieved which shears the excess stud lengths and then presses the still soft stud ends to form heads.

Another feature of the invention is the fact that the apparatus is easily operated by relatively untrained personnel. Little physical effort is required to operate the machine and the operation is rapid.

Another important feature of the invention is the provision of electrical means within the circuitry of the machine which enables the same mechanical elements to be used to de-bind books which have previously been bound on the machine. It will be understood that it sometimes happens that it is desirable to remove the binding in order to make changes in the material on the sheets. The present invention has an alternate electrical circuit which may be actuated by the operator which overheats the rivet-heads, softening them and enabling the strips to be pulled apart, thereby effectively debinding the book.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a front elevation of the machine.

FIG. 2 is a top plan thereof broken away to reveal internal construction.

FIG. 3 is a side elevation with the casing removed and partially broken away to reveal internal construction.

FIG. 4 is a fragmentary sectional view of a portion of FIG. 3.

FIG. 5 is a fragmentary sectional view taken substantially along the line 5—5 of FIG. 1 and showing the parts at the beginning of the cycle of operation.

FIGS. 6, 7 and 8 are fragmentary views of portions of the structure of FIG. 5 showing the parts at different positions in the cycle of operation.

FIG. 9 is a sectional view taken substantially along the line 9—9 of FIG. 1 with portions broken away to conserve space.

FIG. 9A is an enlarged sectional view taken substantially along the line 9A—9A of FIG. 2.

FIG. 10 is a view similar to FIG. 3 from the opposite side.

FIG. 11 is an enlarged, fragmentary view through the bound book.

FIG. 12 is a circuit diagram of the machine.

FIG. 13 is a fragmentary circuit diagram showing alternate means for interrupting retractive movement of the pressure foot at a position intermediate the limits of its movement.

FIG. 14 is a fragmentary circuit diagram showing alternate means for debinding a book.

A. BINDING MATERIALS

The apparatus hereinafter described is used to bind together either temporarily or permanently and to debind pluralities of sheets of paper or the like which are designated in the accompanying drawings generally by reference numeral 21. Cover sheets (not shown) for the front and back of the book may also be used. Each sheet is formed with a series of spaced apertures 22 along one margin thereof, the spacing between the apertures corresponding to the spacing of studs 23 of first

strip 24, hereinafter described. The apertures 22 are preferably round and made by means of a paper punch which is a part of the apparatus herein described, or they may be notches or other shapes. Occasionally, it is desirable to bind pre-punched pages or to re-bind a book such as a paper bound book. Thereupon the apertures 22 of such sheets may be drilled or otherwise formed by separate apparatus. The dimensions of the sheets 21 which are accepted by the apparatus hereinafter described are subject to considerable variation, the apparatus being made large enough to accommodate a range of sizes. The thickness of the book which is to be bound is likewise subject to variation between a very few sheets and a thickness which is within the limits of the lengths of the studs 23 of the strip 24.

First strip 24 is preferably rectangular to cross-section being about ¼ inch wide and 1/16 inch thick. The length is approximately equal to that of the sheets 21. Spaced along the center of one surface of the strip 24 are integral studs 23 preferably round and formed with points 25 at their outer ends. The studs 23 are preferably between 3/32 inch and ⅛ inch in diameter and may be in length up to about 3 inches.

The second strip 26 also is approximately ¼ inch in width and 1/16 inch in thickness and is formed with a series of holes 27 spaced in distances corresponding to the spacing of the studs 23. Preferably, a counterbore 28 is formed in each hole 27 along one surface of the strip 26.

The strips 24, 26 are preferably molded or otherwise formed of a thermo plastic material. One suitable plastic is a rigid polyvinyl chloride. Other suitable thermoplastics are high-impact polystyrene and acrylonitrile butodiene styrene (ABS).

B. CASING OF MACHINE

The apparatus of the present invention is preferably incorporated in a machine similar in general appearance to standard office machines and having incorporated therein certain electrical circuits and mechanical mechanisms, hereinafter described in detail, consisting generally of:

C - punch.
D - pressure foot actuation
E - knife activation
F - forming and cooling fingers
G - electrical circuitry

In the following description, each of these sections of the machine will be described as well as the method of operation for binding and de-binding books.

Casing 31 has a top 32 at the rear, and on either side downwardly-forwardly slanting side panels 33 on which various controls and indicators are mounted. Disposed horizontally between the side panels 33 at the lowermost level is punch platen 34 and at the rear edge thereof is a punch backstop 36 having an opening 37 at its lower edge which accepts papers to be punched in the punch mechanism C. On the left side as viewed in FIGS. 1 and 2 is a horizontally, transversely movable punch side guide 38 which controls the positioning of the left edge of paper placed on platen 34. Guide 38 moves in a horizontal elongated slot 39, the means for moving the guide in and out not being herein explained or illustrated in detail.

At a level above platen 34 is binding platen 41 which is also horizontally disposed and which has a backstop 42 at its rear edge, said backstop being flexibly mounted at its top so that its lower edge may move rearwardly and forwardly within slight limits to accommodate different widths of strips 26, as hereinafter explained. A series of openings 43 are formed in the bottom edge of backstop 42 for the outward extension of cutting knives as hereinafter explained. On the left edge of platen 41 is a side guide 44 moving in a slot 45 and actuated and having a purpose similar to guide 38 and slot 39.

Interiorly of the casing 31 on either side are vertical side plates 46 suitably rigidly interconnected by means not herein illustrated and in which most of the shafts hereinafter described are journalled and to which many of the actuating mechaniams are suitably pivotally mounted.

C. PUNCH

Where the sheets 21 are not prepunched, it is necessary to form apertures 22 therein and a suitable mechanism by which this is accomplished is shown on the right-hand side of FIGS. 3 and 9. Sheets 21 are placed on platen 34 and their left-hand edges are moved against guide 38 and their rearward edges are pushed through slot 37. The height of slot 37 determines the thickness of pages which may be punched and prevents overloading of the punch.

The punch mechanism is preferably driven by its own motor 51 to the shaft 52 of which is connected a check 53. Connecting rod 54 is pivoted on cheek 53 and the opposite punch shaft 57. Longitudinal notch 58 is formed on shaft 57.

Shaft 57 also extends through punch cross frame 59 which is a block of steel in which are formed vertical bores and which reciprocate punch cylinders 61 having tongues 60 which fit into slots 58. Thus, when shaft 57 oscillates, the punch cylinder 61 reciprocates in frame 59.

The number and spacing of cylinders 61 corresponds to the number and spacing of the apertures 22 to be formed in sheets 21. Accordingly at the lower end of each cylinder 61, is a punch foot 62 normally retracted above punch throat 63 formed in frame 59 and reciprocating downwardly below the throat 63 to engage with female punch die 64 formed in frame 59. The throat 63 is in alignment with opening 37 and its back edge limits the rearward movement of the sheets 21 positioned on platen 34. The distance between the back end of throat 63 and the path of punches 62 determines the distance between the edge of the sheet and the hole 22 punched therein. A micro-switch 66, here shown mounted on the end of motor 51, is contacted by a contactor 67 on the edge of check 63.

A single complete revolution of motor shaft 52 with keyed cheek 53 drives crank arm 56 through approximately 60° and back, forcing punches 62 down and lifting them back up. Microswitch 66 stops motor 51 after one complete 360° rotation when contactor 67 strikes lobe 68 on cheek 53.

D. PRESSURE FOOT MECHANISM

At the commencement of the operation, second strips 26 are placed in the machine on bridge 101 (hereinafter described in detail) in a space shown at the rear edge of platen 41 and immediately forward at the bottom edge of backstop 42. As has previously been mentioned, the lower edge of backstop 42 may flex slightly to accommodate different widths of strips 26. Strips 26 are formed with counterbores 28 which are preferably positioned facing downwardly. The left edge of strip 26 is aligned with guide 44. Etched guidelines

47 on backstop 42 allow rapid visual alignment of second strip 26, the holes 27 in said strip 26 being centered on said guidelines. As an optional feature, a small locating hole 49 may be formed in each strip 26 and a matching pin 48 provided to fit into same to properly align strip 26 without using guide 44. Pin 48 may be recessed into bridge 101 (hereinafter described).

Where it is necessary to do so, the sheets 21 are punched with apertures 22 at predetermined intervals along the back edge in the punch mechaniam hereinbefore described. Sheets thus or otherwise punched, are placed on platen 41 and their left edges are aligned with guide 44 thus aligning apertures 22 and holes 27 with guidelines 47 on backstop 42.

Thereupon, strip 24 is applied with the studs 23 inserted through holes 22 and 27. To properly bind the sheets 21 between the strips 24, 26 it is desirable to force the strip 24 downwardly against the sheets and the strip 26 with a predetermined pressure. The mechanism whereby this is accomplished is described in this section of this Specification and is best shown in FIGS. 3 and 4.

Formed in each side plate 46 are front and rear vertical slots 71F, 71R, respectively, each of which has a rearwardly angularly directed offset 72F, 72R. Extending between side plates 46 is transverse pressure foot 73, each end of which is provided with a front and rear follower roller 74F, 74R which is guided by slot 71F and 72F and by slots 71R and 72R, respectively. The shapes of the slots guide the pressure foot 73 so that in its lower movement it reciprocates vertically to a downward position shown in FIGS. 5–8 in solid lines, but in its upward position the pressure foot 73 is rearwardly offset as shown in dotted lines in FIGS. 5 and 6.

Reciprocation of pressure foot 73 is accomplished by mechanism which is actuated by pressure foot motor 76 having a pulley 77 connected by belt 78 to pulley 79 on pressure foot cross shaft 81. On either side of the machine is a screw jack 82 turned by shaft 81 and having a non-rotatable but vertically movable screws 83 vertically disposed on either side of the machine. The upper end 84 of each screw 83 is bifurcated and the lower end of link 86 is pivotally mounted between the bifurcations to oscillate in a longitudinal vertical plane. The upper end of each link 86 is pivoted to spring stem 87 which slides in a cut-out slot 88 through guide hole 94 formed in each end of pressure foot 73. Surrounding stem 87 and within the cutout 88 is a compression spring 89, the lower end of which bears against the bottom of cutout 88 and the upper end of which bears against cap 91 which is fixed to stem 87. An extension 92 on cap 91 slides in a guide hole 93 formed in the pressure foot 73 above opening 88.

When screw 83 is retracted vertically so that the pressure foot 73 is forced downwardly on strip 24 and compresses the sheets 21 against strip 26, further downward movement of screw 83 causes cap 91 to compress spring 89, thereby applying pressure to the sheets. To control the amount of pressure applied, microswitch 95 is connected to pressure foot 73 and is engaged by cap 91 when it has moved to the desired lower limit shown in FIG. 4. Closing of switch 95 stops motor 76 and holds the foot 73 in its full line position shown in FIG. 5 until the additional operations shown in FIGS. 6–8 have been completed. Thereupon, by means hereinafter described in detail, the motor 76 is reversed, causing the pressure foot 73 to be elevated either to its full upward position shown in the dotted lines of FIGS. 5 and 6 or to some intermediate position.

E. CUTTING KNIFE

After the strips 26, 24 and sheets 21 have been placed on the platen 41 supported by bridge 101 and the pressure foot 73 moved down against the strip 24 with predetermined pressure as hereinbefore explained, the mechanism hereinafter described cuts off the excess lengths of studs 23, forms a rough head on the bottom of the stubs of studs 23 and then forces the material from the rough head into the counterbore 28 and cools the same, forming head 29 flush with the bottom surface of strip 26, locking the strip 26 to strip 24, whereupon pressure foot 73 is lifted and the bound book removed.

Extending transversely between plates 46 is bridge 101 located immediately below platen 41 extending rearwardly thereof to a position immediately below backstop 42. The rear edge of bridge 101 is formed with vertical slots 102 corresponding in number and spacing to the studs 23 of strips 24. Thus, when the pressure foot 73 is in downward position, the pointed ends 25 of studs 23 project into slots 102.

Mounted behind backstop 42 is knife assembly 103 which extends transversely of the machine and moves forwardly and rearwardly and also slightly upwardly as hereinafter explained. Projecting from assembly 103 are knife blades 104 which are horizontally disposed along the length of assembly 103 and correspond in number and spacing to the studs 23. Blades 23 are preferably coated with Teflon or plated with Chromium or otherwise treated to prevent the plastic of studs 23 sticking thereto. Interiorly of assembly 103, as best shown in FIG. 5, is an electric cartridge heater 106 in heat transferring relation to blades 104. The rear ends of the blades and heater are captured within transverse horizontal aluminum channel 107 which is held in place by standoffs 108 and surrounded by an insulation box 109, the front of which is closed by face plate 112 through which the blades 104 project. Thermostats 111 and 111A are positioned in proximity to channel 107 and function to control the heat of cartridge 106 and to electrically unlock other parts of the machine.

Assembly 103 is supported at either side of the machine by generally horizontally disposed knife support arm 113 which moves inside plate 46. Directing attention to FIGS. 3 and 9, arm 113 is pivoted to the lower ends of front and rear knife support links 116F and 116R, respectively, said links being immediately inside plate 46. Link 116F is formed with a slot 117 near its upper end to receive pivot 118 fixed to plate 46 and to permit upward movement of link 116F; whereas link 116R is pivoted by means of pivot 119 to plate 46 without provision for upward movement.

Extending transversely horizontally is cam shaft 121, the ends of which are journalled in plates 46, driven by motor 122 by means of pulleys 123 and belt 124. Mounted on the outside of plates 46 on opposite ends of shaft 121 are identical cam bodies 126. On the inward face of each body 126 is a knife horizontal movement control cam groove 127 which controls the inward and the outward movement of assembly 103 from the retracted position of FIG. 5 to the projected position of FIG. 6 and then to the return position of FIG. 8. For such purpose, a follower roller 128 mounted on opposite ends of shaft 129 and located outside plates 46 fits into each groove 127 and also through holes in

link 116R. The shaft 129 which extends across the machine insures that the links 116R oscillate in unison.

Also formed in cam body 126 is cam 131 and on the working face thereof rides knife raising roller 132 which is mounted on cross shaft 133 which extends transversely across the machine. Shaft 133 passes through a hole in link 116F and thus controls upward movement of link 116F. To permit movement of shafts 129 and 133, cutouts 134 are formed in plate 46.

The effect of the shape of cams 127 and 131 is shown in FIGS. 5–8. Under the influence of the shape of cam 127, roller 128 swings link 116R in a counter-clockwise direction from the position of FIG. 3 or 5 to the position of FIG. 6. During this movement, link 116F is in lower position so that the upper end of slot 117 rests on pin 118. Link 116F also swings in counterclockwise position along with link 116R.

Completion of this movment is shown in FIG. 6. Under the influence of shape of cam 131, follower 132 raises link 116F within the limits of slot 117, causing the assembly 103 to be elevated from the dotted line position of FIG. 7 to the solid line position of FIG. 7. The notches 43 in the lower end of backstop 42 provide clearance for the blades 104 in upward position. Retractive movement of assembly 103 from the raised position of FIG. 7 to initial position is controlled by the shape of cams 127 and 131, preferably first downward and then rearward.

The movement from FIG. 5 to FIG. 6 cuts off the studs 23 slightly below the bottom surface of strip 26, the cutoff ends 25 dropping down through slots 102. The upward movement to the position of FIG. 7 heats the stubs of studs 23 remaining below strip 26 and the mass of material is formed in an irregular shaped head, being partially moved into the counterbores 28 in the bottom of strip 26. In some instances the irregularly shaped heads are satisfactory and the heads may be air cooled to harden to hold the book bound together. Where more perfectly formed heads 29 and/or more rapid cooling are desired, then cooling fingers 141, next described, may be installed.

F. FORMING AND COOLING FINGERS

The plastic masses of stub material are optionally but preferably formed with neat heads 29 which are finished smooth and fill the counterbores 28. At the same time, the plastic material is cooled so that strips 24 and 26 are securely bound together.

Directing attention particularly to FIGS. 5 and 8, cooling fingers 141 corresponding in spacing and number to the studs 23, reciprocate in inclined recesses 142 in bridge 101. Each finger 141 is received in a hollow thimble 143 which reciprocates in recess 142 and contains a spring 144 which biases the finger 141 to extended position. However, the force of spring 144 is sufficiently small so that if finger 141 encounters an obstruction, the spring 144 will compress, preventing damage. The upper portion of the exterior of thimble 143 is formed with a rack 146 which meshes with a splined transverse horizontal shaft 147, the ends of which extend outside plates 46. On the outside of plate 46 is a rack 151 which meshes with the end of shaft 147 and is pivoted at its upper end to bell crank 152 which is pivoted to plate 46 by pivot 153. The upper end of bell crank 152 carries a roller follower 154 which fits into the groove 156 of cam body 126. The shape of cam groove 156 is such that fingers 141 are in the retracted positions of FIGS. 5–7 until the assembly 103 has begun its retractive movement. Thereupon, the bell crank 152 is turned in counter-clockwise direction causing rack 151 to reciprocate and to rotate shaft 147. Rotation of shaft 147 in a clockwise direction projects the thimble 143 upwardly and to the left from the positions of FIGS. 5 and 7 to the position of FIG. 8. The ends of fingers 141 are bevelled so that they are parallel to the bottom of strip 26. The projection of fingers 141 moves the plastic stubs on the ends of studs 23 into the counterbores 28 in strip 26 and form neat heads 29 similar to rivet heads which fill flush with the bottom of strip 26 (See FIG. 11). Preferably the fingers 141 are of aluminum or other heat-conductive material which draws the heat from the plastic and causes the plastic to harden. After the heads have had time to harden, the fingers 141 begin to withdraw and the pressure foot 73 is elevated either to the full-up position shown in dotted lines in FIG. 5 or to an intermediate position under the control of the operator. The completed book rivetted construction is best shown in fragmentary cross section in FIG. 11.

G. ELECTRICAL CIRCUITRY

Referring now to the wiring diagram FIG. 12, to start the machine, the operator closes main panel switch PS1 which enables the punch motor 51 to be operated. Upon closing of panel switch PS2, motor 51 is driven to turn punch shaft 57 to lower punches 62. When motor 51 makes one complete revolution of 360°, contactor 67 contacts lobe 68 on cheek 53, tripping switch 66 and stopping motor 51. As has hereinbefore been explained, at times sheets 21 are prepunched, in which case it is unnecessary to close the switch PS2.

Closing of switch PS1 on panel 33 causes current to pass through the cartridge heater 106. When the heat generated by heater 106 is up to the desired minimum range (e.g. 350° F.), thermostat switch 111 closes and light LT1 is illuminated. Companion to thermostat switch 111 is thermostat switch 111A which opens at the maximum desired temperature of the knives 104 (e.g. 400° F.) and which closes before the lower limit of the closing temperature of switch 111 is reached. When switch 111 is closed, "ready" light LT1 is illuminated on panel 33 and the binding cycle can be started. Hence thermostat switch 111 is a locking device which prevents the binding cycle from being activated until the knife blades have reached a certain prescribed minimum temperature; while thermostat switch 111A is a controlling device which fluctuates on and off and maintains a relatively constant cartridge heater temperature.

To bind a book both panel switches PS3 and PS4 are pushed from the "off" (intermediate) position shown in wiring diagram FIG. 12 to "down." PS4 is preferably on the other side of the machine from PS3; thus both hands of the operator must be occupied in closing switches PS3 and PS4, thereby preventing the fingers from being jammed in the mechanism. The closing of switches PS3 and PS4 energizes motor 76 to move bar 73 in a down direction. When switch 95 is actuated by pressure bar 73 reaching an obstacle and the springs 89 being compressed, motor 76 is stopped and LT2 is illuminated. Release of switches PS3 and PS4 allows "RELEASE" lite LT2 to go out.

In normal operation, the pressure bar 73 (controlled by motor 76) remains down for a prolonged period of time. If there is some reason for removing the work from the machine prior to the completion of the cycle,

under the control of the operator PS3 may be moved to "up" position, which reverses motor 76. In normal operation, however, a lobe 161 on the periphery of cam body 126 contacts micro-switch MS4 (as shown in the mechanical drawings) and since MS5 is then also closed, the motor 76 is reversed. MS5 is normally closed but is located so that it is physically opened when the pressure bar 73 reaches its upper position.

Motor 122 which turns cam 126 (and has solenoid brake SB1 in its circuit) controls movement of assembly 103 and fingers 141. It is normally energized when micro-switch 95A (which is physically a companion to 95) is closed, i.e., when the pressure bar 73 is down and spring 89 compressed to the desired degree to apply the desired compressive force to strip 24.

MS3, 4 and 6 are controlled by lobe 161 on cam body 126 which has a 10° arcuate length between 350° and 360° of the cycle of rotation of body 126. When cam body 126 has reached its 350° position and the pressure bar 73 has previously been clamped down, binding motor 122 is stopped because switch MS3 is cammed open by lobe 161. Simultaneously, MS6 is cammed closed by lobe 161, overriding micro-switch 95A which is dependent upon the position of pressure bar spring 89. Simultaneously, MS4 is cammed closed, starting the pressure bar motor 76 in a direction to raise the pressure bar 73. The pressure bar 73 continues to move upward until it reaches the top of its movement whereupon it opens switch MS5 and stops motor 76 and also closes MS5A to restart motor 122. When cam 126 is turning from 350° to 360°, MS6 overrides switch 94A, and when the cam 126 has reached 360°, MS6 rolls off lobe 161 and functions to stop motor 122. Thus, switch MS6 is cammed closed at 350° and cammed open at 360°.

Restarting the motor 122 causes the cam 126 to travel from 350° position to 360° position at which time the pressure bar 73 is up. At 360°, MS4 rolls off cam lobe 161 and is reopened and MS6 also rolls off the cam lobe 161 and stops motor 122.

As viewed in FIG. 13, double pole panel switch PS5 may be used to control whether the pressure bar 73 is moved to full "up" position (dotted line position of FIGS. 5 and 6) or stopped automatically at intermediate position. Where only small stacks of sheets 21 are being compressed and the studs 23 are short, it is unnecessary to fully retract the pressure bar 73 to dotted line position and time is saved. As shown in FIG. 13, one pole of PS 5 in the solid line position controls motor 76 in the same fashion as in FIG. 12. When this pole is in dotted line position, a switch MS7, which is physically located to be contacted by pressure bar 73 when it reaches a partially up position, stops motor 76. The other pole of PS5 controls binding motor 122. Thus, when MS3 is opened when the lobe 161 reaches 350°, either switch MS5A or MS7A restarts motor 122 after pressure bar 73 reaches its intermediate "up" or full "up" position. The switches 5 and 5A and 7 and 7A are companion switches which are opened and closed simultaneously by movement of the pressure bar 73.

Directing attention to FIG. 14, it is sometimes necessary to remove the heads from the studs 23, or in other words, to "de-bind" the book. This function is optional. The de-binding is accomplished by a time delay dwell of the feet knives 104 at the top of their strokes (solid line position of FIG. 7). PS6 when manually moved from full line to dotted line position controls the de-binding function MS9 is controlled by a lobe 161 on cam body 126 at 72° of its cycle of rotation. At 72° the blades 104 are at the top of their movement. When MS9 is opened by lobe 161, motor 122 is stopped and simultaneously power is applied to terminals 2 and 7 of an electric time delay relay 163, which may be of the type designated Syracuse electric time delay relay TDR115A153. Upon passage of a preset time delay, such as ten to fifteen seconds, the output terminals transfer from contacts 1 and 4 to contacts 1 and 3, restarting motor 122. Reset of timer 163 is accomplished by removal of the input power which is done when the binding motor 122 starts and the cam 126 moves past 72°.

Since the heads 29 on the ends of studs 23 within the counter-bores 28 have been melted beyond their ability to retain the strips in place, when the book is removed from the machine it is merely necessary to pull the strip 26 away from the book to break the bind and permit the book to be disassembled. When it is necessary to rebind, the entire operation is repeated, using new strips 24 and 26.

H. OPERATION

In normal operation of the machine, switch PS1 is closed by the operator. Where it is necessary to operate the punch, sheets 21 are placed on platen 34 and their left edges brought into contact with side guide 38 (which has been adjusted for the width of sheets 21) and the rear edges pushed through opening 37 to the back of throat 63. Thereupon, PS2 is closed causing motor 51 to turn one complete revolution until cam lobe 68 throws micro-switch 66, causing motor 51 to stop with punch 61 in the "up" position. Where the throat 63 will not accommodate the full load of sheets to be bound, the punching operation is repeated as frequently as is required. Further, it will be understood, the sheets may be formed with holes 22 by other punching means.

Second strip 26 is placed with the counterbores 28 facing downward in the space between the rear edge of platen 41 and the bottom of backstop 42. The backstop will flex rearwardly slightly if the strips 26 are of extra width. Holes 27 in second strip 26 are aligned with guidelines 47 marked on backstop 42. Guide 44 is adjusted for the width of sheets 21 and used to align the holes 22 in sheets 21 with the holes 27 in second strip 26. Thereupon, the sheets 21 are placed on the platen 41 with holes 22 aligned with the holes 27 in strips 26 by guide 44. Strip 24 is then installed, the studs 23 fitting through the apertures 22 in sheets 21 and also through the holes 27 in strip 26. It will be understood that at this point the pressure bar 73 is either in full-up (dotted line) position or partially up (a position not shown but heretofore described). When full up, bar 73 is displaced rearward, permitting strips 24 with long studs 23 to be used without bar 73 interfering. However, where short studs are used, bar 73 need be elevated only to intermediate position.

The closing of PS1 has energized heater 106 and when its temperature reaches the desired range, thermostat 111 is closed causing light LT1 to illuminate and indicating to the operator that it is possible to proceed with the binding operation.

The operator then moves PS 3 to "down" position causing motor 76 to start. Preferably, there are two companion switches PS3 and PS4 which must be moved simultaneously in the down movement of motor

76 before the motor 76 will start. This is a safety precaution and it is optional. Pressure bar 73 moves down from up position to the down position shown in FIG. 5. When the bottom of the pressure bar encounters strip 24 it forces downwardly and presses the sheets 21 against the strip 26 which is held in place by the metal of the bridge 101 between the slots 102. The pressure is controlled by switch 95 and when the spring has been compressed to the position of FIG. 4, motor 76 is stopped, by reason of switch 95 being moved from normally closed solid line position to dotted line position.

Movement of switch 95 simultaneously causes movement of switch 95A and this causes motor 122 to turn cam body 126 through 350°. As the cam body 126 turns, it first causes links 116F and 116R to move in counter-clockwise direction as viewed in FIG. 3 and this causes the assembly 103 to move from the retracted position of FIG. 5 to the position of FIG. 6. The hot knives 104 cut the studs 23 a distance slightly below the undersurface of strip 26, the excess lengths 25 dropping down slots 102. Cam 131 then causes the link 116F to be raised to the limit of the length of slot 117 and this raises blade 104 to the position of FIG. 7 (solid line) (an event which occurs preferably in about 72° of rotation of cam body 126). The movement of the hot knife blades 104 deforms the stub ends of studs 23 which extend below strip 26, forcing the material into the counterbores 28. Thereupon, the cam 131 lowers the assembly 103 from the solid line position of FIG. 7 to the dotted line position, and then begins to retract it from the dotted line position of FIG. 7 to the position of FIG. 8 which is the same, insofar as assembly 103 is concerned, as FIG. 5. As the blades 104 retract, cam 156 causes movement of bell crank 152 and thus the rack 151 rotates shaft 147 to cause the fingers 141 to move from the retracted position of FIG. 7 to projected position of FIG. 8. Fingers 141 form neat heads on the ends of the studs 23, completely filling the counterbores 28 level with the undersurface of strip 26 and also withdraw heat from the plastic which causes it to solidify. Thereupon, the fingers 141 retract as the cam body 126 continues to turn.

When body 126 has reached 350° of travel, switch MS3 is opened by cam lobe 161 and motor 122 is stopped. MS4 is closed by the same lobe 161 causing motor 76 to be turned in "up" direction. When pressure bar 73 travels to its up position, MS5 is opened, which stops motor 76 and simultaneously MS5A is closed to restart motor 122. At 350°, MS6 is also closed by lobe 161 which overrules switch 95A. Upon closing of MS5A, the motor 122 turns from 350° to 360°, at which time the switches MS4 and MS6 roll off the cam lobe 161, thereby stopping motor 122 and the cycle is ready for repetition.

As has heretofore been explained, the circuit shown in FIG. 13 may be used to stop the pressure bar 73 at an intermediate up position in order to speed up the binding cycle where short stacks of sheets 21 and short stud lengths 23 are employed. Further, as shown in FIG. 14 and in the description thereof, the same apparatus may be used to de-bind the studs on the bound books.

What is claimed is:

1. Apparatus for binding apertured sheets together using a first strip, a plurality of studs projecting from and spaced longitudinally relative to said first strip and a second strip formed with holes spaced longitudinally of said second strip at intervals complementary to said studs, said apparatus comprising a frame having second strip locating means shaped to receive said second strip, a binding platen adjacent said locating means to support said apertured sheets with their apertures aligned with said holes, a pressure bar movably slidable on said frame formed to engage said first strip and to press said strips toward each other with said studs extending through said apertures and said holes and projecting beyond said second strip, cooperating means on said frame and said pressure bar to move said pressure bar toward said first-mentioned means to bring said strips together with said studs projecting through said holes, said cooperating means including a spring flexible when said pressure bar applies a predetermined pressure on said strips to limit said pressure and to maintain said pressure constant for the remainder of the cycle of operation of said apparatus, and cutting means mounted on said frame and movable to cut off the ends of said studs projecting through said second strip.

2. Apparatus according to claim 1 in which said cooperating means comprises a pressure bar motor mounted on said frame, means articulately connecting said motor and said pressure bar, and cooperating guide means on said frame and said pressure bar, said motor forcing said pressure bar in a direction perpendicular to said platen to compress said strips toward each other.

3. Apparatus according to claim 2 in which said guide means comprises at least one slot having an angularly disposed upper end and said pressure bar has a guide roller fitting in said slot, said slot and guide roller displacing said pressure bar at the upper end of its movement out of said direction perpendicular to said platen.

4. Apparatus according to claim 2 in which said motor advances said pressure bar through a resiliently-biased lost motion connection which flexes as pressure of said pressure bar on said strips increases, and which further comprises a switch actuated by flexure of said connection a pre-selected distance, said switch de-energizing said motor after such flexure through said predetermined distance to regulate the maximum pressure of said pressure bar on said strips.

5. Apparatus according to claim 2 which further comprises a first reversing switch contacted by said pressure bar at the limit of the retractive movement of said bar, a second reversing switch contacted by said bar at an intermediate position of the retractive movement of said bar, an electric circuit, said motor being energized in either direction by said circuit, a manual switch selectively connecting either said first or said second reversing switch into said circuit, said circuit terminating energization of said pressure bar motor in a retractive direction either at a fully retracted position or an intermediate position.

6. Apparatus according to claim 1 which further comprises a punching platen on said frame, a plurality of punches, a punch motor, and means connecting said punch motor for reciprocation of said punches.

7. Apparatus according to claim 1 in which said second strip is formed with at least one second hole spaced offset relative to said first-mentioned holes, and which further comprises a locating pin projecting from said second strip locating means dimensioned to fit into said second hole and to further locate said second strip laterally of said apparatus.

8. Apparatus for binding apertured sheets together using a first strip, a plurality of studs projecting from and spaced longitudinally relative to said first strip and a second strip formed with holes spaced longitudinally of said second strip at intervals complementary to said studs, said apparatus comprising a frame having second strip locating means shaped to receive said second strip, a binding platen adjacent said locating means to support said apertured sheets with their apertures aligned with said holes, a pressure bar movably slidable on said frame formed to engage said first strip and to press said strips toward each other with said studs extending through said apertures and said holes and projecting beyond said second strip, cooperating means on said frame and said pressure bar to move said pressure bar toward said first-mentioned means to bring said strips together with said studs projecting through said holes, cutting means mounted on said frame and movable to cut off the ends of said studs projecting through said second strip, and a plurality of heading means mounted on said frame and actuating means for advancing said heading means against the stub ends of studs cut off by said cutting means to form heads on said ends securing said studs and said strips in assembled position and for retracting said heading means.

9. Apparatus according to claim 8 which further comprises heating means on said cutting means to heat and make plastic said ends, whereby said heading means upset said plastic ends, said heading means being heat conducive to cool said ends.

10. Apparatus for binding apertured sheets together using a first strip, a plurality of studs projecting from and spaced longitudinally relative to said first strip and a second strip formed with holes spaced longitudinally of said second strip at intervals complementary to said studs, said apparatus comprising a frame having second strip locating means shaped to receive said second strip, a binding platen adjacent said locating means to support said apertured sheets with their apertures aligned with said holes, a pressure bar movably slidable on said frame formed to engage said first strip and to press said strips toward each other with said studs extending through said apertures and said holes and projecting beyond said second strip, cooperating means on said frame and said pressure bar to move said pressure bar toward said first mentioned means to bring said strips together with said studs projecting through said holes, and cutting means mounted on said frame and movable to cut off the ends of said studs projecting through said second strip, said cutting means comprising a plurality of blades, means reciprocating said blades in a direction transverse to said studs and heating means to heat said blades.

11. Apparatus according to claim 10 which further comprises means for reciprocating said blades in a direction toward said second strip to form heads on the stub ends of cut studs.

12. Apparatus according to claim 11 which further comprises means for holding said blades stationary in close proximity to said second strip to melt said heads to debind said strips.

13. Apparatus for binding apertured sheets together using a first strip, a plurality of studs projecting from and spaced longitudinally relative to said first strip and a second strip formed with holes spaced longitudinally of said second strip at intervals complementary to said studs, said apparatus comprising a frame having second strip locating means shaped to receive said second strip, a binding platen adjacent said locating means to support said apertured sheets with their apertures aligned with said holes, a pressure bar movably slidable on said frame formed to engage said first strip and to press said strips toward each other with said studs extending through said apertures and said holes and projecting beyond said second strip, cooperating means on said frame and said pressure bar to move said pressure bar toward said first-mentioned means to bring said strips together with said studs projecting through said holes, and cutting means mounted on said frame and movable to cut off the ends of said studs projecting through said second strip, said cutting means comprising a casing, a plurality of blades projecting from said casing, a heater in said casing to heat said blades, a cam, means for rotating said cam, follower means actuated by said cam articulately connected to said casing for first moving said casing toward said studs so that said blades cut said studs and then moving said casing so that said blades move toward said second strip to deform the severed stub ends of said studs to form heads on said studs and then retracting said casing to initial position.

14. Apparatus according to claim 13 which further comprises forming fingers, means on said frame mounting said fingers for reciprocation toward and away from said second strip, and second follower means actuated by said cam for moving said fingers toward said severed ends to shape said heads, said fingers being heat conductive to cool and set said heads.

15. A method for binding sheets having spaced apertures along a marginal edge to form a book comprising providing a first strip having a plurality of projecting thermoplastic studs spaced longitudinally of said first strip the same distance as said apertures and longer than the thickness of sheets to be bound and a second strip having holes spaced the same distance as said apertures, supporting said second strip in a manner to resist pressure tending to bend said second strip but to permit said studs to project through said holes, supporting said sheets with their apertures aligned with said holes, inserting said studs substantially simultaneously first through said apertures and then through said holes with the ends of said studs extending beyond said second strip, said first strip resting against the topmost sheet, pressing against said first strip to move said first strip toward said second strip and thereby to clamp said sheets between said strips with a predetermined pressure, maintaining said pressure until completion of said binding method, passing heated blades transversely through said studs in the location where they project beyond said second strip to cut off the excess length of said studs and to heat the stub ends of said stubs when cut off, forming heads on said stubs, cooling said heads to secure said strips and sheets in bound condition, and releasing said pressure.

16. A method according to claim 15 in which said step of forming heads is performed by moving said blades into contact with the severed stubs of said studs to make said stubs thermoplastic and then moving said blades toward said second strip to deform said stubs into heads.

17. A method according to claim 16 which further comprises withdrawing said blades and then moving second members toward said heads to shape and cool said heads.

18. A method according to claim 17 in which the face of said second strip opposite said sheets is formed with counterbores aligned with said holes, said members shaping said heads to substantially fill said counterbores.

* * * * *

Opposition

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No. 81-677

In the Supreme Court

OF THE

United States

OCTOBER TERM, 1981

MINNESOTA MINING AND MANUFACTURING COMPANY, 3M BUSINESS PRODUCTS SALES, INC., RO-BIND CORPORATION, RALLY INDUSTRIES,
Petitioners,

VS.

VELO-BIND, INCORPORATED,
Respondent.

On Petition for a Writ of Certiorari to the United States Court of Appeals for the Ninth Circuit

BRIEF OF RESPONDENT VELO-BIND, INCORPORATED IN OPPOSITION TO PETITION FOR A WRIT OF CERTIORARI

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QUESTIONS PRESENTED

Petitioner's "Questions" Are In Fact Not Presented by this Case

3M has set forth five questions supposedly presented by its petition. They are really five different ways of stating—or misstating[1]—what is really a single question.

More importantly, none of the five questions is in fact presented by 3M's petition. That is because these supposed questions are implicitly premised upon an interpretation of the Velo-Bind patent claims in issue that makes no sense and was rejected by the jury, the District Court and the Court of Appeals.

3M's interpretation is that the term "shear means" does not refer to a knife for shearing binding studs and apparatus to move it, but refers instead to a knife and moving apparatus *plus a heating element*. That interpretation is not only at variance with the ordinary meaning of the term "shear means," but, additionally, ignores the fact that the heating element is clearly mentioned in the patent as something separate and apart from the shear means. Since in fact "shear means" refers simply to the knife apparatus, and does not include the heating element, there is no question but that 3M infringed, for its knife has the same structure and operates the same way as the knife shown in Velo-Bind's patent specifications.

In its effort to create issues worthy of this Court's attention, 3M ignores the fact that its real quarrel with the decision of the Court of Appeals concerns what the claims in issue mean when they refer to "shear means."

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[1]3M's fifth question is wrong in stating that the shear means effects the bind. See Velo-Bind's Statement of the Case.

That is primarily a factual question unique to this case, not an issue of broad importance in federal law.

Given the obviously correct interpretation of the claims in issue by the Court of Appeals, against which 3M dares not mount a frontal attack, the five supposed questions totally evaporate, and there is nothing left for this Court to consider.

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Petitioners,

VS.

VELO-BIND, INCORPORATED,
Respondent.

BRIEF OF RESPONDENT VELO-BIND, INCORPORATED IN OPPOSITION TO PETITION FOR A WRIT OF CERTIORARI

STATEMENT OF THE CASE

3M's statement of the case is grossly misleading. For example, 3M points out that Velo-Bind's[2] commercial product uses a hot knife and that the best mode or preferred embodiment in the forepart of the patent specifications describes how a hot knife may be used. 3M, however, fails to point out that the claims in question are deliberately for a variation which employs a cold knife. In other words, 3M seeks to create an erroneous impression that Velo-Bind's patent protection is confined to a hot knife machine, even though it is clear that the claims in issue disclose and claim a cold knife alternative.

[2]The full name of Velo-Bind is Velo-Bind, Incorporated. It has no parents, subsidiaries or affiliates.

In the same way, 3M urges that its strips differ from Velo-Bind's strips, but 3M fails to point out that the patents are for a machine, not strips.

3M also erroneously suggests that the "shear means" referred to in Velo-Bind's patents causes the bind. The truth is that the bind can be effected by shoving the studs of a male strip through the holes of a female strip where a friction fit is desired, or by ratchet teeth where that is desired, or by fashioning rivet heads where that is to be the method of holding the strips together. Whatever the method of joinder, the shear means simply performs the function of cutting off the excess length of the studs, just as with the 3M machine. This was demonstrated by Exhibit 1663, a machine constructed in accordance with Claim 1 of the '117 patent. *It did not have a hot knife and it did not have a means for hammering rivet heads.* Nevertheless, it bound books beautifully with Velo-Bind friction fit strips. (The 3M Model 1000, being a copy, also made books with the Velo-Bind strips. It did not require 3M's strips with ratcheted studs. PX 1680.)

Further clarification of the record and explanation as to why 3M's statement is deceptive is contained in the Argument.

ARGUMENT

I

INTRODUCTION

The patent claims in issue describe a machine comprising a number of elements or features, one of which is a "shear means."

3M wrongly *assumes* that the term "shear means"[3] refers to a knife,[4] including apparatus to move it, *plus a heating element*. It argues that, although its infringing machine had a shear means consisting of a knife apparatus with the same structure as shown in the Velo-Bind patent specifications, and although it operated identically, there really was no infringement because it lacked a heating element.

What 3M ignores, and what disposes entirely of the five questions 3M says are posed by its petition, is that the jury, the District Court and the Court of Appeals correctly concluded that the "corresponding structure"[5] in Velo-Bind's patent specifications is an unheated knife. It does not include a heating element. Consequently, there is no need to consider equivalents; the shear means element is found identically in the 3M machine. That being so, none of 3M's questions could be reviewed in the context of this case, even if this Court should want to consider them in the abstract.

3M has not asked this Court to re-interpret the claims in issue, and it would not make sense for it to do so, for the interpretative questions are unique to the claims in issue. They do not raise any broad, important questions of federal law. Moreover, it is clear that the Court of Appeals, like the jury and the District Court, correctly interpreted the claims. It gave the ordinary, natural meaning

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[3]One of the patents refers to a "cutting means," rather than a "shear means."

[4]We have used 3M's "knife" terminology because, while it is not as encompassing as the claim language, it is simpler.

[5]*See* 35 U.S.C. § 112.

to "shear means," that is, a knife, not the strained and artificial interpretation demanded by 3M. The Court's interpretation also gave effect to the fact that the patents clearly indicate that the heating element is something separate and apart from the shear means.

Finally, even if, *arguendo,* the "shear means" were to include a heating element, 3M would still be guilty of infringement because the 3M shear means was an "equivalent" of the Velo-Bind shear means (as so interpreted). In this regard, the Court of Appeals did not say anything, much less decide anything, contrary to well-established law. In short, even if the 3M interpretation of the claims in issue were not demonstrably wrong, this case would still not present an important issue of federal law.

II

THE SUPPOSED QUESTIONS WHICH 3M SAYS ARE PRESENTED BY ITS PETITION ARE NOT REALLY PRESENTED BECAUSE THEY ASSUME AN OBVIOUSLY ERRONEOUS INTERPRETATION OF THE PATENT CLAIMS, ONE THAT WAS REJECTED BY THE JURY, THE DISTRICT COURT AND THE COURT OF APPEALS.

A. Patent Protection Is Not Confined to the Best Mode or Preferred Embodiment Shown in the Forepart of the Specification.

The forepart of a patent specification must contain a description of the best mode contemplated by the inventor for carrying out his invention. 35 U.S.C. § 112. Frequently, this is called a preferred embodiment.

It is fundamental that patent protection is not confined to the best mode or preferred embodiment, but includes the variations contemplated by the inventor and set forth in the claims. For example, in *Continental Paper Bag Co. v.*

Eastern Paper Bag Co., 210 U.S. 405, 409 (1908), the Supreme Court stated:

> "[The inventor] filed a description of his invention, explained its principle, and the best mode in which he 'contemplated applying that principle' and did not intend to give up all other modes of application. An inventor must describe what he conceives to be the best mode, but he is not confined to that. If this were not so most patents would be of little worth. . . .[T]he claims measure the invention."

Relying on the *Paper Bag* case, the Supreme Court in *Smith v. Snow*, 294 U.S. 1, 11 (1935), restated the law:

> "We may take it that, as the statute requires, the specifications just detailed show a way of using the inventor's method, and that he conceived that particular way described was the best one. But he is not confined to that particular mode of use, since the claims of the patent, not its specifications, measure the invention."

B. The Patent Law Expressly Permits Multiple Claims So that the Inventor May Obtain Protection as to Variations from His Best Mode or Preferred Embodiment.

Any other rule than that expressed in the immediately preceding section would make the claims portion of the application and the patent practically meaningless. The Patent Law, of course, expressly permits multiple claims (35 U.S.C. § 112), and it is well settled that each claim is to be treated as if it were a separate patent. *E.g., Palmer v. Orthokinetics, Incorporated*, 611 F.2d 316 (9th Cir. 1980). All of this would be pointless if each claim were required exactly to reflect all of the elements shown in the

description of a preferred embodiment contained in the forepart of the specification, preceding the claims.

Velo-Bind wanted protection not just for a hot knife machine, but for a cold knife machine as well, and under the law it was entitled to that protection.

C. It Is Clear that Velo-Bind Disclosed and the Patent Office Granted Patent Protection for a Cold Knife Machine, and the Jury, the District Court and the Court of Appeals so Interpreted the Claims in Issue.

One need only read the claims in issue to ascertain that Velo-Bind intended to disclose and seek protection for a cold knife machine, as well as a hot knife machine, and the Patent Office intended to grant patent protection for a cold knife machine. That is the only reasonable interpretation that one can give to the claims.

The portion of Claim 1 of the '117 patent referring to the knife states that one of the elements of the invention is a "shear means to cut off the ends of said studs projecting through said second strip." It does *not* say *"heated* shear means" and it does not say anything about any feature which would permit the knife to be heated. Moreover, it does *not* say that the purpose of the shear means is to effect the bind as 3M professes to think.

The absence of any intention to require heating in Claim 1 is made even more manifest when one contrasts it with Claim 4 (not in issue), which covers "[a]pparatus according to claim 1 . . . *and* heating means to heat said blades." Similarly, in Claim 9 (also not in issue), we have a dependent claim based upon an independent claim. Again, the independent claim contains no suggestion that the knife

be heated but the dependent claim expressly adds the element that the knife be heated ("—which *further* comprises heating means to heat said shear means to soften said studs as said ends are cut off" [emphasis added]).

In substance, the Patent Office said in one claim that it was providing patent protection for an invention that included various elements, one of which was a shear means, and then said in another claim that it was providing patent protection for an invention that was the same except that the shear means would have to be heated. In the face of that, it is foolish for 3M to suggest that the omission of any mention of heating in the earlier claim was the result of an oversight by the Patent Office. It was obviously intentional, and the claims must be interpreted accordingly. A limitation not present in one claim must not be implied where the same limitation appears in later claims. *Electric Machinery Mfg. Co. v. General Electric Co.*, 88 F.2d 11, 16 (2d Cir. 1937), *cert. denied*, 301 U.S. 702 (1937); *International Banding Mach. Co. v. American Bander Co.*, 9 F.2d 606, 608 (2d Cir. 1925); *see, also, Bendix Corporation v. United States*, 199 U.S.P.Q. 203 (Ct.Cl. 1978). The reason, of course, is that each claim is in theory a separate patent, so that two claims should not be construed to make them identical.

3M has urged that the claims must be interpreted in light of the specifications—and that is true where the claims are in need of interpretation. (In fact, when we use one claim to confirm the correct interpretation of another claim, as we have done above, we are applying that rule which 3M proclaims, *for the claims are a part of the speci-*

fication. 35 U.S.C. § 112.) But we must not let the tail wag the dog; it must always be remembered that it is the claims themselves that are the starting point, and when they are clear, as the claims in issue are here in not requiring a heated knife, that is the end of it.[6] As stated in *Graver Tank & Mfg. Co. v. Linde Air Products Co.*, 339 U.S. 605, 607 (1950):

> "In determining whether an accused device or composition infringes a valid patent, resort must be had in the first instance to the *words of the claim.* If accused matter falls clearly within the claim, infringement is made out and that is the end of it." (Emphasis added.)

Finally, even if one were wrongly to ignore all of the foregoing, and were to look only to the *forepart* of the specification to determine the "corresponding structure," ignoring the claims part of the specification, the result would be the same. The "corresponding structure" would be the knife without any indication as to heating. Only by confusing and attempting to merge two separate elements, one the knife and the other a heater, is 3M enabled to make its hot knife-cold knife argument. Since the heater is not a "corresponding structure" to the shear means, it is not a structure that defines the shear means; the knife is. In short, the corresponding structure in the forepart of the specification is a knife that may be heated or may not be heated, depending upon whether a heating element is or is not added to the claim. In the claims at issue, the heater is not added.

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[6]*See* Koykka, *Infringement of Patents*, 42 F.R.D. 43 (1967) for a further elucidation of these principles.

The Court of Appeals concurred with Velo-Bind's interpretation and rejected 3M's interpretation. The portion of the opinion at pages A6-A7 of 3M's Appendix is dispositive as to this point.

D. The Questions Supposedly Raised by 3M's Petition Evaporate Once the Claims Are Correctly Read.

Once it is seen that Velo-Bind's shear means is a knife, and does not include a heater, even 3M has no basis to deny its infringement. The 3M knife is identical to the Velo-Bind knife, and it operates identically, so there is no need to consider the doctrine of equivalents.

In short, 3M's petition is based upon an interpretation of the claims in issue that is demonstrably wrong. All of the five questions that 3M says are posed by its petition evaporate as soon as the obviously correct interpretation is applied.

III

EVEN IF THE CLAIMS WERE TO BE WRONGLY INTERPRETED TO PROVIDE FOR A HEATED KNIFE, THE 3M COLD KNIFE WOULD BE AN EQUIVALENT.

It must be evident that the claims in issue quite properly refer to a shear means not requiring heating—or, speaking loosely, a cold knife. The irony is, however, that even if 3M's hot knife interpretation were supportable (and it clearly is not), still 3M would have infringed. Its cold knife would be a "shear means" within the meaning of Claim 1 and the other claims.

Where "means plus function" language is used in claims, the claims will be construed to cover only the corresponding structure disclosed in the specification itself, and equivalents of such structure.

Equivalence is established where a person having ordinary skill in the art would have known of the interchangeability of the feature disclosed in the patent. *Graver Tank & Mfg. Co. v. Linde Air Products Co.*, 339 U.S. 605, 609 (1950); *Stearns v. Tinker & Rasor*, 252 F.2d 589, 597-98 (9th Cir. 1957); *Lockheed Aircraft Corp. v. United States*, 553 F.2d 69 (Ct.Cl. 1977). It is indisputable that a person skilled in the art would have known that, just as a hot knife will cut, so will a cold knife, and, if rivet heads are not required, a cold knife will do it just as well. Thus, even if, contrary to the correct interpretation, the shear means in Velo-Bind's claims in issue were construed to be a hot knife, it would follow that the cold knife would be an equivalent—so, for purposes of infringement, the 3M cold knife would be a "shear means" under the doctrine of equivalents. Tr. 1020:10-1023:5.

While the Court of Appeals rested its opinion that 3M infringed upon the fact that the claims in issue did not include a heater, it noted that, even if the claims had been interpreted to specify a heated knife, Velo-Bind would have established infringement under the doctrine of equivalents. That conclusion was essentially factual and therefore unique to this case. Moreover, it did not state or imply anything inconsistent with classical principles of equivalence. Seeking a review of this dictum, 3M once again fails to establish anything more than an ill-founded factual controversy resolved against it by the jury, the District Court and the Court of Appeals. It raises no real issue of federal law, let alone an important one.

CONCLUSION

3M's Petition demonstrates its discontent with how factual questions were resolved below. 3M, however, cannot point to a single statement of law in an unsettled area or a single statement of law that is at variance with the law stated by the Supreme Court or any other circuit. Accordingly, Velo-Bind submits that 3M's Petition should be denied.

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ON CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT

REPLY OF MINNESOTA MINING AND MANUFACTURING COMPANY IN SUPPORT OF ITS PETITION FOR CERTIORARI

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No. 81-677

In the Supreme Court of the United States

October Term, 1981

MINNESOTA MINING AND MANUFACTURING COMPANY, 3M BUSINESS PRODUCTS SALES, INC., RO-BIND CORPORATION, RALLY INDUSTRIES,
Petitioners,

vs.

VELO-BIND, INCORPORATED,
Respondent.

ON CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT

REPLY OF MINNESOTA MINING AND MANUFACTURING COMPANY IN SUPPORT OF ITS PETITION FOR CERTIORARI

Velo-Bind offers red herring to divert attention from the need for review.

Whatever is embraced in the "shear means" of the patent, the Statute, 35 U.S.C. §112, *requires* that the claim:

> "*shall be construed* to cover the corresponding structure, material, or acts *described in the specification* * * *."[1]

1. Emphasis supplied throughout.

What Velo-Bind's specifications call for is indubitably a "hot knife." (See Petition, pages 3-4). The "strips are sheared off by the application of heat, leaving the ends of the studs in softened condition" for formation into heads. '117 Patent, Col. 1, lines 45-46.

Whatever is embraced in the "shear means", the knife in the 3M accused device has nothing to do with, and serves no purpose in effecting, the bind. It operates *after* the bind is completed to cut off the surplus ends of the strips used in making the bind. It is not so in the case of the Velo-Bind knife which effects an essential step in making the bind.

It would be pointless, argues Velo-Bind (pages 5-6):

> "if each claim were required exactly to reflect all of the elements shown in the description of a preferred embodiment contained in the forepart of the specification, preceding the claims."

The difficulty with Velo-Bind's argument is that the Congress, by 35 U.S.C. §112, thought otherwise. It allowed the inventor the choice, as here, to claim an element as "a means or step for performing a specified operation." Thus, the inventor *need not* in the claim recite the "structure, material or acts in support thereof * * *."

But, the price Congress exacted was that:

> "the claim *shall be construed* to cover the corresponding structure, material, or acts described in the specification * * *."

Velo-Bind does not advance its case when it argues (page 3) "the Court of Appeals, like the jury and the District Court, correctly interpreted the claims." The only supporting authority that comes to mind is the World War I lyric: "Everybody was out of step but Johnny".

Every other Court of Appeals that has considered the problem has come to a contrary conclusion. (See Petition, pages 10-12.)

The conflict should be resolved.

Velo-Bind finds comfort (page 6) in "The absence of any intention to require heating in Claim 1 * * *." The intention is put there by the Statute, 35 U.S.C. §112, in view of the description in Velo-Bind's specifications.

In like vein Velo-Bind says (page 7) "it is foolish for 3M to suggest that the omission of any mention of heating in the earlier claim was the result of an oversight by the Patent Office." 3M does not so suggest. The Patent Office was fully aware of 35 U.S.C. §112. That is why it allowed the claim.

The Court should grant 3M's Petition for Certiorari.

Respectfully submitted,

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